I N F L U E N Z A.

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I N F L U E N Z A.

D E F I N I T I O N.

Influenza is a contagious, infectious, epidemic, pandemic, or endemic specific pyrexial, protean and polymorphic disease characterised by catarrh of the respiratory passages, digestive tract, or nervous system, as well as sometimes by general phenomena out of all proportion to the apparent gravity of the affection, and accompanied by symptoms and lesions which vary according to the severity and character of the epidemic observed.

I do not claim the above to be a perfect definition, but I do hold that it covers the principal phenomena as I have actually observed them in practice. Indeed, a perfect definition does not probably exist, at least what is usually termed a definition: for the disease is at times so protean, so varied, so irregular, and so surprising that to define it comprehensively would be, as it were to display a symptomatological epitome.

S Y N O N Y M S.

Influenza has an extensive literature and innumerable symonyms. Many of these are the outcome of the profession attempting to give it descriptive designations: others are of popular origin, suggested by its sudden occurrence, certain of its symptoms, or its widespread prevalence.

The Russians have called it the Chinese Catarrh; the Spaniards, Influencia Russo and Catarrho Epidemica; the Germans, Epidemischer Husten and Russiche Krankheit; the Dutch, Zinkinggkoorts; the Swedes, Smiezyge-Douein, Snuffjuka, and Snuffeiber; the French, La Grippe, Grippette, Coquette, Générale, Baraguette, Petite Poste, Horion, Tac, Dando, Ladendo, Allure, Petit Courier, Rhume Epidémique, Fièvre Catarrhale, Fièvre Catarrhale Epidémique, Catarrhe Epidémique, Synoque Catarrhale, and Bronchite Epidémique; and in our own country it is termed "Cold" or "Epidemic Cold", or, in deference to medical authority, as Catarrh" or "Epidemic Catarrh"; and at present, both by the laity and profession, as "Influenza."

Various names, as stated, indicate its supposed origin; thus it has been called in Russia, Chinese Catarrh; in Germany abd Italy, the Russian Disease; and in France such vague names as the Italian Fever and the Spanish Catarrh have been given to it.

It was the Peripneumonia Notha of Sydenham and Boerhaave, the Peripneumonia Catarrhalis of Huxham, and the Pleuritis Humida of Stoll; but these synonyms are both obsolete and meaningless, and are now not taken seriously on account of their historical rather than

scientific interest.

Certain terms given influenza by the older writers no longer retain their one-time place in the literature of the disease, e.g., Defluxio Catarrhalis Epidemicus, Febris Catarrhalis, and Rheuma Epidemicus.

The great controversy which has raged around the supposed nature of the disease has found expression in such synonyms as Catarrhis a Contagio (Cullen) and Cephalalgia Contagiosa; and there are many who hold that Epidemic Catarrhal Fever is, with its Latin equivalent, the most satisfactory of the so-called scientific names by which the disease is at present known.

An indication of the national character of the populations who have been troubled with the scourge will be seen in the popular synonyms for influenza, many of these recognising in the affection a resemblance to some common circumstance or thing, or even making the malady the subject of jest. The French in particular have displayed a nosological frivolity and in direct proportion to the gravity of the subject thereof. Thus they have found a new name for almost every great epidemic, and each more trivial than the last. Thus, Tac (rot); Horion (in jest, a blow); Quinte, because the spells occur at intervals of five hours (sic); Coqueluche (a hood or cowl), from the cap worn by those suffering from the disease; and so on throughout the array of synonyms that I have already given.

I Germany, too, the people have likened influenza to various things. In the laboured respiration and the character of the cough they find a suggestion of a common epizootic affecting the sheep, hence Schaffhusten and Schraffkrnakheit; or because the cough is like the crowing of a cock and the disturbance of respiration and rapid prostration suggest some resemblance to a common disease of the domestic fowl, it has been called Huhner-Weh (Chicken Disease, whooping-cough), and Ziep, which is about equivalent to pip. Furthermore, from its diffusion they term it Mödefieber, and from its equally rapid invasion Blitz-Katarrh.

ETYMOLOGY.

I find that the derivation of La Grippe is somewhat obscure; given to the disease, it is said, by Sauvages, the term comes, according to Landouzy of Reims, from the "agripper"- to snatch. According to J. Frank, it is derived from a Polish word, "chrypka" (raucedo) signifying hoarseness.

The term Influenza is apparently of Italian origin. It is said that the disease received this name because its sudden outbreak and wide prevalence were attributed to some influence of the stars, or, according to others, from a secondary significance of the word indicating something fluid, transient, or fashionable .

HISTORY.

Although influenza has had not occurred in the widespread or pandemic form that we now know it prior to the beginning of the sixteenth century, it will be of profit perhaps to briefly pass in review some of the earlier manifestations of the disease (some of these probably not influenzal at all), in order that the irregular and protean character of the affection may be apparent.

B. C. 412.

Hippocrates and Livius mention an epidemic which prevailed in B.C.412 which was probably influenzal, though details are lacking in their respective narratives.

B. C. 415.

The same remark applies to the Sicilian Athenian army outbreak in B.C.415.

475.

This year, according to Hirsch, marks the first occurrence of undoubted influenza.

827

There would seem to have been many outbreaks of a disease closely resembling out influenza in the ninth century, a very virulent and widespread cough being observed in 827.

870

In the year 870 there was, according to Naunmann, a widespread affection with influenzal symptoms.

876.

In this year the Italians were decèminated by a similar epidemic which speedily overspread Europe, birds and dogs also suffering from a disease not unlike that observed in human beings.

976.

The whole of Germany and of France in this year was visited by an epidemic of fever with cough of a very severe character.

1173.

For two centuries the world seemed to be at rest as regards epidemics, but in 1173 there broke out a widespread affection, affecting the whole of Europe, of which the predominant symptom was a very distressing cough. Naunmann doubts that either this or the 870 epidemic could be regarded as influenzal.

1239-99

There were epidemics of a similar character during the thirteenth century in the years named.

1311.

In his "Practice of Medicine", Aitken mentions a very fatal outbreak of influenza in France, there giving rise to great consternation and enormous morbidity.

1323.

According to Buoni Segni, there was in the autumn of this year a very virulent catarrhal epidemic in Tuscony and throughout the whole of Italy.

1335.

Schnurrer speaks of the prevalence of a scourge in

Germany, in which cough and cerebral symptoms were very conspicuous.

1387.

A catarrhal disease, described by Valesco of Tarente, deceminated, in 1387, the population of Montpellier; and he mentions that there prevailed such a widespread cough that scarcely one person in six escaped , and that nearly all the senile members of the community died.

1403.

The epidemic of 1403 is said, by Pasquier, to have been widespread throughout France - so much so that, in Paris, some 100,000 persons were unable to drink, eat, or sleep; they lost all power of their bodies, and could not bear being touched in any part thereof. Indeed, the mortality was so alarming that the Parisian courts of justice had to be closed.

1410.

In 1410 there was, according to Schnurrer, an epidemic of violent cough accompanied by cutaneous hyperaesthesia.

1411.

The same authority speaks of the prevalence of cough in Paris, the paroxysms of the same being responsible for several abortions.

1414.

Mézeray speaks of the prevalence in this year, in France, of a peculiar pertussal cold, which was productive of a considerable mortality, especially amongst old people, and which rendered the voice so hoarse and indistinct that the courts of law, colleges, and pulpits remained without orators.

1420.

In France in this year, there was, says Pasquier, an epidemic from which innumerable individuals suffered, and were, whenever they partook of nourishment, thrown into a high fever; the outbreak lasted for about a month, and was accompanied by perversion of taste and extreme sensibility of the skin.

1427.

The same writer makes mention of another epidemic, in France, which commenced with pain over the region of the kidneys, gravel, and shivering, being followed by a cough so severe that the sermons of preachers in the churches could not be heard for the coughing noises of the audience.

1438.

According to Carli, there occurred in Verona an epidemic catarrh which overspread Italy, and was very fatal to persons at the extremes of life.

1505.

In this year Gaspard Torelli makes mention of an affection which overspread Italy and Spain, being accompanied by fever and a harsh and violent cough and rhinorrhoea, and which spared scafcely anybody and had many victims amongst old people.

1510.

This year marks the occurrence of the first accurately described epidemic of influenza in this country. The affection seems to have started from Malta, invaded Sicily, then Italy, Spain, and Portugal, then crossed the Alps into Hungary and Germany, extending westward into France and Great Britain. Its track

widened over all Europe from the southeast to the extreme northwest; and it is said that not a single family or scarce a person escaped it. It was attended by severe headache, heaviness, difficulty of breathing, hoarseness, loss of strength and appetite, restlessness, and retchings from a distressing hacking cough. Thomas Short further adds that "presently succeeded a chilliness and so violent a cough that many were in danger of suffocation. The first day it was without spitting, but about the seventh or eighth day much viscid phlegm was spit up. Others (though fewer) spat only water and froth. When they began to spit, cough and shortness of breath were easier. None died except some children. In some it went off with a losseness, in others by sweating. Bleeding and purging did hurt".

This epidemic, or rather pandemic, was likewise described in considerable detail by Sennert and Mézeray. It was called by Fernel the Coryza Suffocant (gravedo anhelosa) and also Coqueluche, Cephalalgia, Catarrh or Epidemic Cough. The development of parotid swelling was looked upon as the precursor of almost immediate death.

1557.

This epidemic seemed to have taken origin in Asia, thence spreading all over Europe, and crossing the Atlantic to America. The affection broke out in England in the month of September. The historian of the outbreak says that "presently after were many catarrhs, quickly followed by a more severe cough, pain of the side, difficulty of breathing, and a fever. The pain was neither violent or pricking, but mild. The third day they expectorated freely. Some, but very few, had continued fevers along with it; many had double tertians; others simply slight intermittent. All were worse by night than by day; such as recovered were long valetudinary, had a weak stomach and hypped". Pregnant women either suffered abortion or died. The spread of this epidemic was quite alarming in its celerity, thousands being attacked by the disease at the same time. In a single day practically all the population of Nismes fell ill with the disease, and there were many fatalities. In Mantua Carpentaria, a small town near Madrid, it broke out in August, and was so fatal were the bleeding and purging which constituted the treatment at first, that, of the 2000 persons who were bled, all died. The diease raged in some parts till the middle of the following year, and carried off, in Delft alone, 5000 of the poor. In all cases mild treatment was called for, with warm broths and speedy immersals, in order to "recall the appetite and keep the vessels of the throat open".

Pasquier gives some interesting details of this epidemic, stating that few escaped it, that there was a constant discharge from the nose, a great testicular affection, and a fever which lasted for twelve or fifteen hours and then subsided of its own accord.

Valleriola observed such symptoms as the following in this epidemic: Headache, dyspnoea, hoarseness of the voice, chills, fever, violent cough, and the expectoration of a very viscid material, after the fourteenth day, which was difficult to raise. During the course of the affection the patients complained of lassitude, loss of strength, and anorexia, as well as perversion of taste, restlessness, langour, and insomnia. The disease was in one case accompanied by diarrhoea, in another by

sweating. Infants succombed in great numbers.

Forestus also observed the prevalence of influenza at Alcamaër, where sore-throat became so generalised that it attacked whole families at a time. The fever was sometimes continued, but more often assumed the character of a spurious double tertian. After recovery there remained an extreme atony of the stomach and hypochondriacal symptoms.

An anonymous writer states that, in the month of July, the affection, then commonly called "coqueluche" declared itself in the city of Nimes, and there was terrible in its ravages. The patients recovered only after the occurrence of perspiration induced by bleeding and expectorants.

1562.

Ripperger states that there was an outbreak of influenza in 1562 which was particularly prevalent in Italy.

1563.

Bauhin tells of this epidemic that the patients suffered from severe headache and diarrhoea, and that few anywhere escaped it.

1580.

In this year there occurred the second pandemic of influenza, the first one being, as stated, in 1510. The affection spread from the southeast towards the northwest, over Asia, Africa, and Europe from Constantinople and Venice, and extended over Hungary and Germany to the farthest regions of Norway, Sweden, and Russia. It prevailed in England, and was described there by Thomas Short. In Italy it was rife during August and September, in England from the middle of August to the end of September, and in Spain during the whole of the summer. In most places its duration was about six weeks. The termination was, as a rule, favourable. In the account of Thomas Short it is stated that "few died except those that were let blood or had unsound viscera." In some districts, on the contrary, the course of the disease was very severe. In Rome 2000 died of it, and according to Short; but in that city Zuelzer affirms that probably five times as many as that died, and he adds that Madrid must have been next thing to depopulated by it. This enormous mortality is considered by some as being due to the free venesection practised in the treatment of the disease. The symptoms were similar to those in the previous epidemics, with great shortness of breath, which continued in many cases after the disappearance of the catarrhal symptoms.

Diversus writes of this epidemic that it prevailed over the whole of Europe, and even throughout Asia and Africa. The symptoms which he observed were headache, complete anorexia, abolition of taste, and an unpleasant secretion from the mouth and pharynx which descended into the chest. There also existed, he says, an extreme lassitude; the number of patients was enormous, and it was scarcely possible to come across an individual who had not suffered or was not suffering from this pandemic affection.

Bockel tells of the occurrence of swelling of the parotid glands and purulent discharge from the ears. He regarded the epidemic as benign, however, there being

scarcely one death in a thousand attacks. He thought the common practice of bleeding responsible for the fatalities observed.

Conara, who witnessed this epidemic at Venice, says that it had the attributes of an inflammatory fever, with hoarseness, dryness of the tongue, headache, insomnia, cough, thirst, depression, nausea, general lassitude, vertigo, and constipation.

Zacutus noted, in Portugal, the beneficial effects of sweating at the fourth or fifth day, and also the death of the patients in high fever when this was lacking.

In Holland, Wier was amazed at the widespread character of the outbreak, and considered the sharp and harsh cough as one of its most peculiar symptoms.

Sennert mentions this outbreak as characterised above all things by catarrh and malignant universal cough; but otherwise he did not regard it as essentially different from the epidemics of 1510 and 1557.

1590 and 1591.

Sansonius tells of an epidemic of influenza which prevailed in Italy and carried off nearly all the patients in a state of frenzied delirium on the twelfth day. The initial symptoms were very high fever, cough, and coryza.

1593.

This year saw an epidemic which extended through France and into Italy (Ozanam).

1626-27.

A catarrhal epidemic made its appearance in Naples, and from thence overspread Italy. It was characterised by nasal obstruction, cough, hoarseness, and angina.

1642-43.

The disease prevailed in Holland with the usual symptoms.

1647.

In this year, according to Webster, influenza is for the first time mentioned in American literature. That author mentions that Hubbard narrates that it "began with a cold and in many cases accompanied by a light fever. Such as bled or used cooling drinks died; such as made use of cordials and more strengthening things recovered for the most part. It extended throughout the plantations in America and in the West Indies; there died in Barbadoea and St. Kitts five thousand or six thousand each".

1657-58

This epidemic is described by Willis as occurring in England, and it is about this period that the disease began to be known as influenzalit is not without interest to observe that the influence of the stars suggested itself, in connection with its sudden appearance and wide prevalence, to the minds of the physicians of this date. Willis writes that "about the end of April, 1658, suddenly a distemper arose, as if sent by some blast of the stars, which laid hold of very many together; that in some towns in the space of a week above a thousand fell sick together". Many old people succombed, as well as the feeble and debilitated. Out author points to the

excessive heat of 1657 and the extreme and premature cold of the winter as responsible fot the occurrence of the disease.

1663.

A catarrhal disease made its appearance suddenly in Venice. More than 60,000 persons were attacked in a single week. It originated, it is said, in the very thick fog arising from the Adriatic Sea.

1669.

It is said that the summer of this year was preceded by a foggy spring, and that great atmospheric variations culminated in a catarrhal epidemic in Germany, the Low Country, and Denmark. Ettmüller tells us that the disease was not very fatal and that the prominent symptoms were cough, nasal obstruction, dull headache, pains in the loins and extremities, and a more or less burning fever.

1675.

In this year an influenzal affection prevailed in Germany and Great Britain. Sydenham fully describes it, and says that the disease was initiated by pains in the head, that pneumonia was a common complication, and that bleedings were fatal.

1679.

An epidemic of influenza prevailed in this country and France during a part of the winter of this year.

1688.

This epidemic was attended by a high mortality in England and Ireland. Short states that "at the middle of May began a fever in London all over England, and all over Ireland in July. The symptoms were the same in all. It began and ended its course in seven weeks..... Though not one of fifteen escaped it, yet not one of a thousamd that had it died." Speaking of a contemporaneous epizootic he adds that "it was generally observed, both in England and in Ireland, that sometimes before the fever began a slight but universal disease seized horses, viz., a great defluxion of rheum from their noses."

1691.

Ozanam mentions an epidemic which broke out in Hungary, Styria, Corinth, the Tyrol, Switzerland, and on the banks of the Rhine. It was characterised by a hard cough, haemoptysis, serous and foetid expectoration, and a burning fever. The affection was not serious in its effects, in spite of some troublesome and alarming symptoms in the way of convulsions, somnolence, and delirium.

1693.

Influenza was very rife in Dublin in this year, commencing in the early part of November, so that few escaped it. Oxford was also visited by the scourge, and it appeared in London a month after its appearance in Ireland. From thence it spread to Holland and Flanders. The predominant symptoms were violent cough, much discharge from the nose and eyes, hoarseness, sore-throat, and pleurodynia. Critical perspirations ended in a spontaneous cure of the disease. Molineaux gives a detailed description of the outbreak, and says that elderly persons were comparatively immune. According to him, "all conditions of persons were attacked, those residing in the country as well as those in the city;

those who lived in the fresh air and those who kept to their rooms;those who were very strong and hardy were taken in the same manner as the weak and spoiled;men, women,and children,persons of all ranks and stations in life,the youngest as well as the oldest".

1695.

This catarrhal epidemic received in Paris the name of "quinte",because of its stubborn five-hourly cough.It showed itself also in Rome,where many infants succombed to it.Baglivi reports thatat this time there was an epidemic of apoplexy under the influence of great meteorological disturbances.

1699.

Catarrhal fever at Breslau.It ended in five days with critical expectoration.Failing this crisis,it gave rise to a slow periodical fever of a quotidian type. There were also not infrequently observed dull headache, delirium,angina,and thrush.

1702.

The same author describes a Roman catarrhal epidemic accompanied by headache,apoplexy,and ending sometimes in sudden death.

1709.

This epidemic has been well described by Lancisius, who states that it prevailed in France and Italy,the principal features being rheumatoid pains,angina,and haemoptysis.There were very few deaths.

1712.

This epidemic prevailed in Germany,especially at Tubingen.Peripneumonia was very commonly observed.At Berlin young boys were especially prone to attack.The fever was of the continued type,or was remittent with evening exacerbations.Epistaxis,parotitis,and otorrhoea were not infrequently observed.

1729-30.

This outbreak of catarrhal fever in its pandemicity and duration presented a singular analogy to that of 1889-90.It covered practically the whole world.It was seen successively in Saxony,Germany,Switzerland,Holland, England,Scotland,Ireland,France,Italy,and Spain,thence extending over the sea to America.There were various symptoms,such as headache,inflammation of the frontal sinuses,otitis,perspirations,epistaxis,profuse expectoration,suffocative catarrh,pneumonia,vomiting,etc.In Scotland three forms were described - the nervous,the thoracic,and the abdominal.Complications were frequent, and,as later in 1889-90,old people and weaklings paid a heavy tribute to the disease.The serious cases presented cerebral congestion,delirium,articular pains,and diarrhoea.Some special symptoms were observed,particularly purpuric eruptions,ophthalmias,and glandular tumours in various situations,Pulmonary tuberculosis, hydrothorax,and anasarca were apt to attack those who survived the acute stage o f the disease.Two months before the appearance of the epidemic,it is said that all the horses in Edinburgh and vicinity were attacked by cough and coryza.

1732-33.

In this epidemic,amongst the ordinary signs of catarrhal fever,there were described inflammation of

the gums, parotitis, and orchitis. The affection was fatal to the poor and devitalised, old people, infants of tender age, consumptives, and, in general, to individuals with anterior taint. At Edinburgh, it is important to note, prisoners, and many children in one of the hospitals, as well as the tenants of the adjoining houses, escaped the disease.

1737.

This widespread epidemic of influenza is well described by John Huxham, of Plymouth, who says that" about this time a disease invaded these parts which was the most complete epidemic of any I remember to have met with; not a house was free from it; the beggar's hut and the nobelman's palace were alike subject to its attacks, scarce a person escaping either in town or country; old and young, strong and infirm, shared the same fate". It appears that the disease had prevailed in Cornwall and the west of Devonshire from the beginning of February; it reached Plymouth on the 10th, which was a Saturday, and on that day numbers were suddenly seized. The next day multitudes were taken ill, and by the 18th or 20th of March scarcely any one escaped it. "The disorder began at first with a slight shivering; this was presently followed by a transient erratic heat and headache and a violent and troublesome sneezing; then the back and lungs were seized with flying pains, which sometimes attacked the heart likewise, and though they did not remain long there, yet were very troublesome, being greatly irritated by the violent cough which accompanied the disorder, in the fits of which a great quantity of a thin, sharp mucus was thrown out from the nose and mouth. These complains were like those arising from what is called catching cold, but presently a slight fever came on, which afterwards grew more violent; the pulse was now very quick, but not in the least hard and tense like that in pleurisy; nor was the urine remarkably red, but very thick, and inclining to a whitish colour; the tongue, instead of being dry, was thickly covered with a whitish mucus or slime; there was an universal complaint of want of rest and a great giddiness. Several likewise were seized with a most racking pain in the head, often accompanied with slight delirium. Many were troubled with a tinnitus aurium, or singing in the ears; and numbers suffered from violent earaches or pains in the meatus auditorius, which in some turned to an abscess. Exulcerations and swellings of the fauces were likewise very common. The sick were in general very much given to sweat, which, when it broke out of its own accord, was very plentiful and continued without striking in again, and did often in the space of two or three days wholly carry off the fever. You have here a description of this epidemic disease such as it prevailed hereabouts, attacking everyone more or less; but still, considering the great multitude that were seized with it, it was fatal to but a few, and that chiefly infants and consumptive old people. It generally went off about the fourth day, leaving behind a troublesome cough, which was very often of long duration, and such a dejection of strength as one would hardly have suspected from the

shortness of the time. On the whole, this disorder was rarely mortal, unless by some very great error arising in the treatment of it; however, this very circumstance proved fatal to some, who, making too slight of it, either on account of its being so common and not thinking it very dangerous, often found asthmas, hectics, or even consumptions themsleves, the forfeitures of their inconsiderate rashness."

This epidemic is also fully described by Arbuthnot, who considered the uniformity of the symptoms in every place as most remarkable; and he says that there was a "great run of hysterical, hypochondriacal, and nervous distempers: in short, all the symptoms of relaxation".

1742-43.

At this time influenza again overspread Great Britain, Holland, France, and Italy. The disease received for the first time the name of "grippe" in France. The weather appeared to be particularly inclement during its prevalence. In Saxony, pleurisy, peripneumonia, angina, and other chest troubles were very common, and for the relief of the disease venesection proved of considerable service. It has been estimated that, in London alone, over 1000 persons died in a single week, and that in Paris 40 per diem succombed. A kind of itch, a mortal consumption, and a suffocative catarrh seems to have decimated the horse of the locality before the appearance of the epidemic. The physician to the Elector of Saxony states that the affection was very prevalent in that country, and also that it was particularly evidenced by pleurisy, peripneumonia, and mortal anginas.

1748.

Malouin tells of an epidemic of catarrhal fever, malignant in its manifestations and productive of delirium, which occurred in Paris in this year.

1753 and 1756.

During the winter of 1753 there prevailed in Beance, and even in the vicinity of Paris, an epidemic of influenza, which was not infrequently complicated by pleurisy and peripneumonia. It was also observed to a slight degree in the district of Etampes (Fuster).

In 1756 the disease was also observed in the Manche district; but there are many who, from the peculiar symptoms observed, regarded it as a variety of typhoid fever or even of cerebrospinal meningitis. The garrison at Boulogne-sur-Mer, indeed, died in great numbers with ataxic phenomena.

1758.

According to Whytt, this epidemic commenced in Scotland towards the end of September, particularly in Edinburgh, and reached its acme early in the following month. "Old as well as young", he says, "were taken ill; nay, even women in childbed, who were not exposed to the cold air, were affected. He tells us that the epidemic began to subside on the twenty-fourth day of the last-mentioned month; but he is not sure whether this was due to a change in the weather, or because the disease had already attacked most people, although the latter seems more plausible to him, particularly as he says that "in Edinburgh and its vicinity not one out of six or seven

escaped", and in other localities it is said to have been even more severe in its manifestations. In the north of Scotland, also, the epidemic was widespread from the middle of October to the end of November. A local practitioner wrote to our author that "it was one of the most universal epidemic I ever saw, and I am persuaded that more people were seized with it than escaped", and he also affirmed that it was not very fatal. Implication of the respiratory muscles, lungs, a pleura seemed to have increased the number of fatalities towards the end of October. Before the occurrence of the epidemic, we are told that there existed - in September - an epizootic amongst horses in Perthshire. "The horses", Whytt says, "were observed to be more than usually affected with a cold and a cough"; but, as the weather at the time was both mild and dry, he did not think that the atmosphere had anything to do with the propagation of the disease, not did he regard the latter as at all contagious.

1761.

The epidemic of this year overspread both Europe and America and the West Indies. The prominent symptoms were pains in the head and limbs, sensations of coldness, shiverings succeeded by great heat, running at the nose, and a frightful cough. It ended with diaphoresis after a duration of about a week.

1762.

The whole of Europe and Great Britain was invaded by an influenza epidemic in this year. On page 76 of "Thompson's Annals of Influenza we read that it appeared at London and in its vicinity in the beginning of May and remained there during the whole of May and a part of June. The disease appeared in Ireland, where it was severe and ignored few persons, - also Scotland, where the first cases appeared in Edinburgh in the month of April. In June, Strasburg and all of Alsace were attacked. In the middle of July the disease laid hold on Nimes, where, according to Saillant, it spared few persons. In the same month British sailors fell ill with it on the Mediterranean Sea, and in September and October it was still present in a number of provinces of France. The affection, however, was this year very irregular in its travels, appearing here and there without any apparent sequence. It seemed to have commenced in Germany, viz., in February at Breslau, in March at Vienna, in April at Hamburg, Magdeburg, and Bremen; it had also visited Hungary and Denmark. As a rule, only consumptives and asthmatic old people died of it, its mortality being generally low. With the exception perhaps of abortions and premature labours, its was singularly free from complications. Those who exposed themselves unduly to the influence of cold, however, suffered from pleuritis and pneumonia. In France it was termed at this time " Le Petit Poste", "Le Petit Courier", "La Grippe", and "La Baraquette" (Razoux).

1767.

A nervous, but benign, form of influenza is reported by Villalba as overspreading Spain and a part of Europe. Heberden mentions that it commenced in London in June

after excessive cold. The symptoms were of a particularly inflammatory nature. The intermittent fever observed gave way to the exhibition of conchona. Pecq and Clôture speak of the prevalence of catarrh in Normandy towards the end of autumn. Amongst the principal symptoms there noted were articular pains, anorexia, great weakness, dyspnoea, convulsive cough, and general spasms. In spite of these alarming symptoms, the disease invariably retained its benign character.

1769.

A catarrhal epidemic raged in the district of Bourbonne-les-Bains; it attacked the poorer classes especially, and amongst them gave rise to a frightful mortality. Pecq and Clôture saw a similar disease in Normandy in the winter, accompanied by general debilitation, anxiety, , oedema of the eyelids, and often swelling of one of the arms. A great number of persons died on the fourth or fifth day.

1772.

There was an epidemic of influenza in this year, in the early part of which it prevailed in all parts of America in the form of a catarrh, attended or followed by measles of unusual malignancy. It is therefore highly doubtful if the disease was influenza at all, and there are many writers who refuse to consider this an influenza year.

1775-76.

From March, 1775, to January, 1776, influenza invaded successively Germany, Italy, England, Scotland, Ireland, and France, and seems to have originated in the first-mentioned country - it appearing, in the autumn of 1775, in the village of Clausthal, in the Harz Mountains. In June it had invaded Vienna. From June to September it is not mentioned, but in the latter month it again made its appearance in Italy. In the months of October, November, and December the disease broke out in England, as well as in France, and in the latter country it was still present in January, 1776. The most accurate information which we possess of the epidemic of this year is contained in the medical observations and inquiries by a society of physicians in London (Thompson). The affection originated, according to Fothergill, in London in the beginning of November; old asthmatic persons suffered most. He said that he had no knowledge of any other example of an epidemic disease "where so many persons were seized, and so short a time, and with so little comparative mortality". Mention is also made of an epizoötic: "Horses and dogs were much affected, the horses had severe coughs, were hot, forebode eating. Sir George Baker says that the epizoötic probably began a few days before the 20th of October. He did not observed the white appearance of the tongue to which Fothergill attached so great an importance in the diagnostic sense. There did not appear to have been any fatalities, but Heberden says that "it seemed to hasten the death of two or three persons whom it found dying of age and other diseases". The institutional prevalence of the affection is mentioned by Thomas Glass. "Ther e sickened", he says, "in the Exeter Hospital all the inmates, one hundred and seventy-three in number; one hundred and sixty-two had coughs. Two or three days

after the hospital was invaded the city workhouse was attacked;of the two hundred paupers housed there,only very few escaped the disease".We have it on the authority of Pulteney,of Blandford,that influenza was present there before it visited London.He speaks in high terms of the beneficial influence of venesection, as a result of which he thinks none died of the disease.He tells of an epizootic,and says that he "heard much of horses and dogs having been affected,before we heard of it among the human race".The disease,according to Daniel Rainy,of Dublin,raged in one of the institutions of that city.It gained an entrance to the House of Industry which contained at the time about 267 persons,varying in age from 12 to 90 years.No less than 200 of these 267 inmates were attacked.They suffered from swelling of the tonsils and the submaxillary glands,purulent parotitis,abscesses in the ear,premature births,convulsions in women during menstruation, herpes labialis,and scarlatiniform eruptions.In Germany the abdominal form almost exclusively prevailed;in France the encephalic form at first,thereafter giving place to thoracic phenomena and prostration in many instances.In that country the affection was termed "Générale",its characteristics being grave respiratory phenomena and sharp rises of temperature.In Paris the children were attacked by a convulsive cough like that of pertussis,and the affection frequently involved the lungs,pleura,liver,kidneys,and spleen.Saillant speaks of a very grave form of the disease characterised by a sudden and total prostration,overwhelming,as it were,the patient and occasioning oftentimes speedy death.

1780.

This was a generalised epidemic,invading England, France,Italy,Germany,Asia,and America.Scarcely any one was able to avoid it.It was called "Générale", " Granade","Foulette",and "Coquette" in France.Other serious affections contemporaneously prevailed.

1782.

This year was marked by the appearance of an epidemic of influenza,the most remarkable that had hitherto been observed,and one which in many instances seems to have borne a striking resemblance to the pandemic of 1889-90.It commenced in Russia in the early part of January,after a sharp rise of temperature, 40,000 persons being attacked in the first few hours of its presence.It prevailed in America also,and rapidly made headway in Germany,Holland,France,and afterwards overspread the entire earth.The symptoms consisted especially consisted of thoracic and cerebral troubles,accompanied by a severe sternal and interscapular pain,and often by extreme prostration.Old people, consumptives,and the subjects of heart disease were particularly prone to attack.In London and Geneva the disposition to sweating was remarkable;and abundant diaphoresis from the outset seemd to be of favourable omen:indeed,some of the writers of thetime termed it "the sweating disease".In London about four-fifth of the population were attacked.

1788.

A catarrhal epidemic declared itself in Paris in

the middle of July, in the form of a mortal dysentery, at one of the institutions there. It overspread Europe and had abdominal symptoms.

1800.

This epidemic was confined to the northern part of Europe. In France it was specially characterised by abundant and foetid perspirations in grave cases - in others by fever and cough, the crisis of the disease being marked by profuse expectoration. Some of the patient had typhoidal symptoms, and many young persons died during the first few days with convulsive phenomena.

1802.

In the month of January of this year influenza overspread England, Italy, France, and Germany. There were frequently observed pneumonic symptoms, especially in Italy. In Paris the symptoms were mainly catarrhal, and there the disease principally laid hold on the artisan classes in the slums.

1803.

A very remarkable epidemic prevailedin this year in Russia, France, and Italy, attacking especially the poorer classes. It gave rise to cerebral troubles, anginas, ophthalmias, otitis, parotitis, and, though rarely, thoracic inflammations. The disease was in general very grave, and few persons seemed to have been able to escape it. Its mortality in Paris was very great, where it seemed to explode on everyone in the course of a few days. At the acme of its prevalence there were noted such accidents as apoplexies, rheumatism, and abortion, metritis, cystitis, and ophthalmia. The pneumonias appeared seldom to have advanced beyond the stage of engorgement.

1805-06.

This epidemic made its appearance in Marseilles, Montpellier, Narbonne, Toulouse, and other French towns. There were described ophthalmias, otitis, peripneumonias, anginas, and membranous formations in the throat. Some of the cases were complicated with typhus, particularly at Narbonne.

1812.

There was in this year epidemic catarrh at various parts of France, accompanied by fever, peripneumonia, rheumatism, and gastric disturbances.

1820-1822-1823.

Catarrhal fever at Geneva and Dublin, described in detail by Lombar, Marc d'Espine, and Stokes.

1831.

During the summer of this year influenza broke out in Paris, and was generally benign, though on its decline there were observed abdominal troubles accompanied by cramps.

1833.

Influenza in this year overspread Europe, Asia, and the northern parts of Africa, its being confined to the Eastern Hemisphere and avoiding America. It would seem to have originated in Asia, for we know that the disease prevailed in upper India in the December of the preceding year, and that it was observed in Moscow, St. Petersburg, and Riga in January, 1833. From Russia it

overspread Europe and other parts. The epidemic arrived at Memel, in Prussia, near the frontier, in February, spreadin in March - Berlin - and in the following months over the whole of Europe. At the same time it made a wide detour to the south and southeast, invading Odessa on the Black Sea in February, Brody, in Galacia, in the same month; in March it prevailed in Constantinople, and travelled in this month as far as Syria and Egypt. The northern countries, Denmark and Sweden, were invaded in March and April. In the latter month influenza also visited Hungary (Pesth), Paris, and London and Edinburgh. It Italy it made its appearance first in May, in June it invaded the Netherlands, in September Switzerland, and by November it had passed through the whole of Italy as far as Sicily, where the epidemic seemed to have then ended. The morbidity of the disease was very great. In St. Petersburg, accordint to Lichtenstaedt, no one escaped it; and in Prague, according to Kahler, there was not a single family without one or other of its members sick of it. Hufeland mentions that in St. Petersburg ten thousand, in Memel eight thousand out of a hundred thousand, in Berlin at least fifty thousand inhabitants were attacked. It is said that four-fifths of the Parisians suffered from the scourge. In Königsberg, according to Hufeland, parents, children, and servants were frequently smitten with the disease at the same time, so that nurses had to be engaged to wait upon them, and also servants to do the work of the house. In this city the ordinary mortality was greatly augmented from the usual monthly number of 40 or 50 to 105 in a single week. It appears that the sequels of influenza caused many deaths in Prague, about a seventh of all the patients succombing. On the whole, however, the mortality was not much increased by the influenza in Prague in this year, and in Bohemia, it is said, the death-rate was even less than usual. In Königsberg, Bohemia, and Austria it was observed that other diseases during the influenza epidemic diminished in frequency. The outbreak was variously attributed to air-infection, telluric influences, and the proximity of the moon to the earth.

1834.

Influenza in this year prevailed in Cayenne and Rio de Janeiro in the months of January and December respectively.

1837.

The epidemic of this year broke out first in St. Petersburg in the month of December; but in November it had already visited lower India and the Island of Java, contemporaneously prevailing in Capetown in Africa. In Sydney, Australia, the disease is said to have been present in October. The question as to the starting-point of the epidemic is, however, by no means determined. The disease, about the same time as it was observed in Russia, invaded Sweden, Denmark, Berlin, and Great Britain. In January, 1837, it again visited Egypt and Syria, as also France, Ireland, and the Netherlands and Switzerland. In February, 1837, the affection reached upper Italy, also Spain and Portugal; in March it was still present in some parts of Southern Europe and in Switzerland; in

July it appeared in the Faroë Islands. According to Hirsch, the influenza prevailed also in Mexico in March, 1837: the morbidity was again very high. One of the Historians, who had personal experience of this epidemic was Gluge. He says, among other things, that two-thirds of the scholars were absent from the Gymnasia in Paris; that among 1,200 patients who reported to the Central Bureau in that city, there were 1,050 suffering from influenza, and in Berlin about 40,000 patients suffering from the disease. The epidemic was also very prevalent in Milan, Rome, Bologna, and Pisa. In Vieena, according to Stern, only very few persons escaped it entirely in this year. The whole of the Prussian army suffered also from it in some form or other. The diease showed a marked preference for adults from 20 to 40 years of age, and of these more women than men were attacked. The children of Würtemberg, however, mainly suffered from the affection. It markedly increased the London mortality, and a very large number of persons died in Dublin of it. During the week ending January 24, 1837, no less than 871 Londoners succombed to influenza, and the next week a very large number also. Pneumonia seemed to be the most common complication of this epidemic. French authors were the first who had their attention drawn to the peculiarity of the pneumonia of influenza and pointed it out. According to Piorry, the latter differs from ordinary pneumonia, in the first place, by its complicating a bronchitis, by its gradual development, and by the peculiar physical signs in the lungs: the respiratory murmur is at first diminished, later it becomes absent altogether, then bronchial breathing appears, without the recognition of dulness or crepitant râles, as we find in true pneumonia. According to Nonat, the pneumonia of influenza makes its appearance before the second or third day of the disease, occasionally even after five to six days: Nonat himself was not infrequently able to discover only rhonchi and rattling sounds over the whole lung. Out of 16 patients 8 died. Vigla says that influenza aggravated chronic diseases of the respiratory tract, especially tuberculosis of the lungs, and that it had an unfavourable effect upon the spinal cord and other parts of the central nervous system. Other disturbances than those mentioned were: Psychoses, e.g., mania, neuralgia, apoplexy, paresis, paralysis, swelling of the parotid gland, meningitis, abscess of the ear, uterine haemorrhage and abortion, miliaria, and urticaria. As regards the general symptom complex, it appears that in all cases there were observed by the medical attendant a functional disturbance of the nerve centres previous to the local symptoms. One of the most frequent complications was a disturbance of the chest and abdominal viscera; and, no matter how diverse the other symptoms of the disease, one organ seemed always to be attacked, viz., the brain and spinal cord.

1838-47.

Influenza prevailed in every year of this period with the exception perhaps of 1840. We have it on the authority of Hirsch that the following epidemics were observed: In 1838 (February), on the Island of Bourbon

and in Iceland; in Australia and New Zealand in November. In 1839, in Abyssinia. In 1841, in Germany in January and February; in March, in Germany and also in Pesth in Hungary; in April, in Germany, Hungary, and Dublin. In 1842, in Belgium; in January; in March, in London; in the spring in Egypt, Chilli, and Paris. In 1843, in Germany, England, and Iceland in March; in April in Paris; in May, in Northern Siberia; in the summer, in North America greatly disseminated, during June in New England States, New York, and the West; during July in Pennsylvania, the Middle and Southern States, Virginia; and in South Carolina in August. In 1844, in Germany and England in January; in February, in France and Switzerland; in Cayenne in November. In 1845, in England, Denmark, Belgium, and in 1846-47, in the winter, in Germany, Switzerland, and Paris; in February, in Russia; and in Constantinople in March and August. Doellinger says that "polka fever" was one of the Brazilian nicknames of the disease in the 1846-47 epidemic.

1847-48.

Influenza prevailed in Constantinople in August, 1847, and in September and October it overspread the south of France. Soon after it appeared in Germany, where it became general in the three last months of the year; at the same time it was scattered about the other European countries - the Netherlands, Denmark, and Great Britain. In December the affection travelled to Switzerland, to upper Italy, and the Riviera, thence to Spain - Madrid - and Greece and Egypt and Algiers. In the same month it visited Paris and Scotland. In January the disease prevailed in lower Italy and the south of Germany. This epidemic, like the previous ones, showed a high morbidity. Marc d'Espine says that there were attacked by the disease one-fourth to one-half of the Parisian population, and in Geneva a third of the inhabitants; whilst in London it laid hold of 250,000 individuals. More women than men were attacked, and proportionately more children than adults. The disease was attended with a frightful mortality in Belgium, and wherever it occurred the average death-rate was considerably raised. Indeed, we have it on the authority of Peacock that in persons over 60 years of age the mortality was increased 247%, in persons from 15 to 60 years of age, 104%, and in children 83%.

1850-51.

An epidemic of influenza overspread the whole of America in the winter of 1850-51; in December it occurred first in Martinique, and then travelled over the western coast of South America, from Peru to the lower part of Chilli. It was also seen in Paris in March and April, as well as in some districts in the north and east of France. In the January of 1851 it visisted California in North America, beginning in this month also in some parts of Europe, invading Germany and Sweden in February, and in March France, Italy, and Egypt.

1852.

This year saw influenza in Chilli and Peru in South America, as well as in Australia and Tasmania.

1853.

In the month of May, 1853, influenza raged in the Faroë Islands, and from thence spread to the continent.

1855.

The whole of Europe was overspread with influenza, and with remarkable rapidity: for in January it broke out in St. Petersberg, and had reached, via Germany, in the same month both the Netherlands and Italy and Naples. Doellinger says that influenza prevailed also in Brazil in the same year at Rio de Janeiro; it did so in the month of June, attacking the whites mostly, the mixed races only occasionally, and the negroes not at all.

1857-58.

Influenza at this time seemed to affect the whole world almost, so that it was regarded by Sennert as one of the greatest of epidemics. The disease occurred first in America, in August in Panama, in September in the West Indies and along the western coast of South America - Chilli and Peru, as well as in Vancouver's Island. In December it prevailed in Russia, Germany, Belgium, and France; in January it had reached Italy, and in the middle of February it was observed in Greece at Athens. In Strassburg the mortality was very great, and the same is true also of Rome and Naples.

1860.

In June and July of this year influenza appeared in Australia and Tasmania. It also prevailed in France.

1862.

The disease prevailed in epidemic form in Holland, France, New Caledonia, and California.

1863-64.

It was now observed in practically the same places as in the above year.

1866.

Influenza overspread Paris, reached London in May, and was seen on the the islands of Mauritius and Réunion in the following December.

1867.

Paris, Stuttgart, and Ghent were again invaded in the second, third, and fourth months of this year; but in

1868.

Turkey seemed to be alone affected.

1870.

The disease broke out in Russia, thence extending to Germany, Denmark, and Sweden, and finally in Norway.

1873.

For three years there seemed to have been a freedom from influenza, but it now prevailed from January to March, especially in the United States of America, being generally disseminated through Pennsylvania, Ohio, Virginia, Illinois, Iowa, Michigan, Wisconsin, Minnesota, Alabama, Louisiana, and Texas.

1874-75.

During this winter influenza also occurred extensively in America, and it also spread to Germany, France, and Sweden.

1879.

America again experienced the effects of an influenza epidemic in this year.

1880.

During the latter part of the summer and autumn of this year an extensive influenza, of moderate intensity prevailed as an epizootic, chiefly affecting horses, in Canada and the United States of America east of the Mississippi River. Dogs were also affected, but less generally, and human beings to a still slighter extent. In several localities where this invasion was observed the horses were first affected, the dogs next, and after the lapse of some weeks, as the animals were recovering, the disease became epidemic; but those persons who took care of horses and were much in contact with them enither suffered earlier nor more severely than others not so exposed to contagion. In certain localities an epidemic was also observed of typhoid fever prior to the influenza outbreak.

1889-90.

This was one of the most important of all the pandemics, not only as regards its remarkable propagation, but also because of the many opportunities afforded by it for observation and the recognition of the epidemiological qualities of the disease. The affection appeared, in the last quarter of 1889, first in the eastern portions of Europe, then in the central and western portions. During the first months of the year 1890 it spread farther and farther, travelling through all the countries of Europe, extending to America, Africa, and Australia - its pandemic character being thereby fully observed. In the second half of May, 1889, it broke out in Bokhara, in Central Asia, subsiding there only in August of the same year; it then travelled to Siberia, where - at Tomsk - cases of influenza were observed with certainty in October, having already previously invaded European Russia and the Caucasus. In October, 1889, it overspread the whole of St. Petersburg, dying out only in December, in the meantime extending to other cities of Russia, also to Abo, Stockholm, Copenhagen, Paris, Berlin, Vienna, Brussels, and London. It appeared in Asia Minor early in January, 1890, and also in Rome, Constantinople, and Athens. Towards the end of 1889, and in the beginning of 1890, it prevailed in Fetz and Tunis, later in Mexico, South America, and Australia, thus sparing no climate and showing itself in hot as well as in cold seasons, in the plains as well as at the elevated spots. In all places the chief commercial cities were first attacked; and thence the scourge spread the other localities, invading the rural communities. Very soon the contagious properties of the disease were established, though they had been doubted at first by many. It was only a question whether the patient alone carried the infection, or whether the latter was disseminated by the clothing of healthy persons who had come in contact with patients suffering from the disease. Peoples of all ages were attacked, those in all conditions of life, and individuals in every trade. The course of the disease in general was favourable and also quite rapid; unfavourable only in many children during the first few years of life, in many old people, in many debilitated persons, and especially in those suffering from diseases of the

respiratory organs. In spite of the fact that the first cases of the disease occurred in the East, and that the affection travelled via Asia to Russia and the rest of Europe, it seems that, after it had reached busy Europe, the avenues of trade now influenced its dissemination in a greater degree, as to its direction and rapidity, than the inclination formerly ascribed to it of travelling from East to West. Its appearance as Siberian fever in the districts of Viatka in Eastern Russia, and in Tomsk in Siberia, about October 28, has been proved sufficiently. The first cases of the epidemic appeared in St. Petersburg between the middle and end of October, and in the beginning of November in Moscow, Wilna, Riga, and Sebastopol. In rapidly following succession the surroundings of St. Petersburg were invaded by the disease, and the disease had a firm hold on Berlin by the end of November. Berlin and Charlottemburg were the first cities in Germany to be attacked by the epidemic, preceding, however, by only a few days the cities on the shores of the Baltic; Danzig and Kiel were next attacked, then Altona and Potsdam and the large commercial cities, Halle, Leipsic, Dresden, Frankfort-on-the-Main, Essen, and Dortmund. It was by this time impossible to say whence arose the new sources of contagion, owing to the large number of foci of influenza existing. The following statistics give some idea of the rapidity of dissemination, although the disease in Germany invaded so many localities in a short time that the individual foci could not be distinguished from each other: The first appearance of the influenza in 998 localities distributed over the whole of Germany - cities and villages was recorded as follows - End of October, in 150 localities; beginning of November, 12; middle of November, 16; end of November 62; beginning of December, 103; middle of December, 150; end of December, 307; beginning of January, 33. We find it stated in the publication dealing with the influenza epidemic in the German army at this time that the ports of the Baltic were considered as the door of entrance of the scourge for the German garrisons, and it shows that the influenza spread very rapidly, that is to say, in five weeks, from northeast to southwest, to the most distant points. The mortality as 0.1%; and the total number of persons affected in the army and navy was 55,263, or 10.5% of the Sixteenth Army Corps, and 20% of the two Bavarian Corps. It was human intercourse, and especially comerce, that constituted the determining factor in the dissemination of the influenza of 1889-90. Its explosive appearance in numerous localities at the same time led to many false beliefs. It was believed that there could hardly be found a scale to measure the velocity of its progress. Thus Collin remarked before the Parisian Acadeny in the year 1889: "The grippe is independent of any kind of human intercourse. It travels through densely populated localities and uninhabited regions with the same velocity as light and air". It is not to be marvelled at, that the newspapers of that period also published the most wonderful flights of imagination, that the germs of the disease were aëriform, or that they filled great spaces in high regions like

cosmic dust, to be precipitated from thence on to the various portions of the earth's surface at the same time. At present we know that the pandemic is not more quickly disseminated than would be possible by our most rapid means of travel, the railroads and the ocean steamers. At the same time, however, we learn that the pandemic of 1889-90 travelled far more rapidly than that od 1830-31; another proof of the fact that its dissemination is linked to commerce. This is also very evident from the fact that the disease frequently spread more rapidly from a trading centre to capitals and other commerical cities than from the latter to villages in their vicinity. Thus, it happened frequently that the railroad towns were earlier attacked, while places having but little commerce, e.g., towns on the Russian-German frontier, numerous country districts, as in Thuringia, and the Black Forest and the Bavarian Forest, were visited only at a late period by the scourge. In localities sparsely settled, and in widely separated villages, the influenza frequently spent more time in spreading through a small territory than it needed for its dissemination to all the chief towns of Europe and even to cross the ocean. In some of the British country districts the disease took from December to March - four months - in its invasion, while the same purpose was effected in a few weeks in some of the industrial districts. Nevertheless, as in all epidemics, there were observed in this one some striking differences. The affection being preeminently a disease of the respiratory organs, it is easy to understand that external factors, such as the weather, etc., will favour or retard its propagation. This is especially apparent when we read of the exceptions to the general rule of the rapidity of dissemination of the disease. This it is said, for example, that in the district of Bradwell, which had little trade and consists of widely separated farm houses, a very rapid dissemination took place, whereas elsewhere in this country its progress was remarkably slow. Not until the end of December or the beginning of January were the cities of Birmingham, Manchester, Glasgow, Sheffield, Liverpool, and Edinburgh invaded, after London had become infected on the 11th of the month of January. A glance at the literature of the disease shows that few localities escaped this epidemic. Such few were the Isle of Man, the West Indies, the Bahamas, Grenada, St. Lucia, British Honduras, British New Guinea, and the Seychelles. The influence of commerce was well shown in a few instances, in which influenza occurred only late, because up to that time there had been an entire interruption of commercial intercourse. The island of Borkum had no intercourse with the mainland from Christmas to January 5th on account of the intense cold. On this date the first passenger boat arrived, and four days later the disease broke out. Vladivostok and the Island of Saghalein were only invaded in the spring of 1890, after communication by boat had again been opened. In some villages on the Wesner, which had been cut off from all communication for weeks by flood, the disease did not make its appearance again until communication had been opened again. The

spread of influenza by leaps and bounds is also probably due to the irregularity of intercourse. Thus, it is certainly curious that Paris and London were earlier visited by the epidemic coming from Russia than many cities of Germany. In Boston and some other North American cities the disease appeared earlier, or at least as early as in England. It seemed to have visited Boston before New York. For this reason some authors point out that North America was probably infected by way of Siberia, from the west therefore. This probability is also borne out by the fact that cases of the disease had already occured on a steamer which was under way from Japan to San Francisco, in the beginning of December. Remarkable as these leaps are, they do not prove that there is no law of dissemination, and they are by no means without explanation if carefully studied. The disease invariably first attacked localities lying along large commercial routes, and after then the parts having little trade. It should also be remembered that the places having constant intercourse with the outside world in all probability reported the first cases of the disease with greater promptitude; and it is also likely that the first cases were more easily recognised in such places as had a resident or easily available qualified medical practitioner. I hold, then, that social or commericial intercourse must constitute a very important epidemiological factor in this disease, though there may be others requiring consideration.

Subsequent Epidemics.

I have shown clearly, I think, that influenza acquired almost a world-wide distribution in the course of a few months; and it now remains to be noted that this pandemic manifestation was followed by many small currents which slowly disappeared. In 1893-93 another influenza epidemic appeared in many places, and was rightly looked upon as a recrudescence of the 1889-90 outbreak. Between these two epidemics there had not been any time altogether free from influenza, there being here and there individual cases or small epidemics observed. A somewhat trivial epidemic appeared in the spring of 1893, and in the last month but one of that year Europe became overspread with a somewhat larger outbreak of influenza. Corresponding with this there was a sudden increase of deaths and acute diseases of the respiratory organs. In the third week of November, for example, there were observed: in Hamburg 202, in Frankfurt about 106, in the district of Düsseldorf 27; in the fourth week of November, respectively 818, 248, 163 cases of influenza. The remarkable increase of deaths was first observed in a few cities of Central and Western Europe, later also in the northern part. Although it existed at the same time in surrounding countries, an importation from either side cannot be proved with certainty. The occurrence simultaneously at different parts is affirmed by Rahts. For the most part the height of the epidemic was reached in December. In individual cities, among them Munich, Augsburg, Breslau, and Dresden, the mortality figures rose for the second time towards the end of the epidemic. The extinction of

this epidemic took place in March, 1894. As a rule, the inhabitants of the country seem to have suffered more than those of the towns and cities. No age was spared, but persons between 25 and 50 years of age were attacked by preference. No trade was a sure protection. The disease seemed to have a marked preference for the postal, telegraph, and railway employees, and the latter especially when engaged on the trains. From time to time since 1894, various outbreaks of influenza have been observed, with greater or lesser severity in this and other countries; but none of the m seemed to have been so world-wide in distribution as the epidemic of 1889-90. In 1908 a considerable prevalence of the disease was observed im this country, particularly at Scarborough, in Yorkshire, and the contemporaneous occurrence of the so-called pink-eye in horses was observed.

Miscellaneous Considerations.

So it has come to pass that influenza has again become a familiar disease and has been carefully and thoroughly studied. One the one hand, many of the popular delusions and professional conjectures in regard to it have been dispelled, while, on the other hand, some of the shrewd observations of the older practitioners have been confirmed. The bacteriological nature of the infecting principle has been demonstrated. From the date of the 1889-90 pandemic the disease takes it proper nosological position among the acute infecting maladies. Much work, however, remains to be done. Where and under what conditions the infecting principle originates, and what the influences may be that from time to time call it into activity and send it forth in definite directions over the earth, are points that must be still further investigated.

I have now and then made reference to the fact that catarrhal affections have frequently prevailed among domestic animals during epidemics of influenza. Horses, dogs, and cats have manifested these disorders. Neat cattle and sheep have been less commonly affedted. These epizoötics have in some instances preceded the outbreak of influenza amongst human beings; in other instances they have appeared at the same time; while in a widespread outbreak among horses in the United States (1872) influenza spared human beings except to a limited extent. In 1880 in the same country, following an outbreak of the disease among men, an extensive epizoötic, chiefly affecting horses, prevailed in Canada and East of the River Mississippi.

Finally, I must not omit to mention that there have now and then been observed strictly local epidemics of influenza, confined to one city, to circumscribed portions of a city, or even to certain houses in one or several different districts. This is naturally of great interest from many points of view, and we are confronted at once with the important question whether the pandemic scourge, as it occurred in 1889-90, for instance, could be caused by the same micro-organism as these local outbreaks just referred to. At first sight it would seem easy to answer in the affirmative, in view of

the discovery of Pfeiffer's bacillus herinafter to be described. But as a matter of fact we find that bacteriological examinations are in many of these cases of strictly localised or house epidemics or endemics neglected, and we possess evidence, therefore, in only a few instances. The smaller epidemics ofsuch years as 1893-94 were certainly of the same nature as the great pandemic of 1889-90, for this has been demonstrated both clinically and bacteriologically. That it did not again increase to such a pandemic may have been due to the fact that the soil was not favourable, the greater number of people, at least, still retaining a certain degree of immunity. The fact that the influenxa bacillus may exist for a very long time in the secretions of the patient is by some accepted as ane of the alleged corroborations of the hypothesis that there exists a pandemic influenza caused by Pfeiffer's bacillus and also an epidemico-endemic influenza of identical nature which develops after the pandemic infection has run its course, being caused by the germs left by the latter. Leichtenstern is an advocate of this theory. It is, however, quite different with the prevalence of various kinds of catarrhal fever, which are often called influenza or grippe by both the profession and the laity; and it is very necessary that we should not include these cases of false influenza in their etiological relations with the true disease. Sporadic cases of coryza and bronchial catarrh should, then, never be mistaken for influenza, although the symptoms of the latter may be imitated in an exquisite manner. In none, of these, however, can the specific bacillus be found. When it is discovered it means that the affection has been incorrectly diagnosed.

ETIOLOGY.

Although the determining cause of influenza is well known to be Pfeiffer's bacillus, the importance of the subject demands that we should consider some of the factors which are said to predispose to the occurrence of the disease.

HEREDITY.

This seems to be without direct influence upon influenza, although an inherited constitutional taint would perhaps make an individual liable to an attack of this, as of any other similar affection, under conditions suitable for the implantation of the casual agent.

AGE.

There is no age which offers an effective resistance to the occurrence of influenza, although it was alleged that in the pandemic of 1889-90 children under 5 or 6 years of age were generally less susceptible to the disease than others, and also that infants are next thing to immune. Thus, Flesch reports a series of cases in which nursing mothers were attacked by influenza while the children at the breast escaped - an observation which is corroborated by Fehling, who states that not one of the nursing children in his wards took the disease, notwithstanding that they were nursed by mothers suffering with influenza. Others have also remarked upon the slight susceptibility to infection during the first year of life. The statistics of past epidemics do not give us any special information concerning the relative susceptibility at different ages, and the attempt has therefore been made to collect such statistics concerning the ages of patients admitted to hospital. Up to a certain point such statistics are useful, if we take into account at the same time the average admission for a series of years. Leichtenstern gives a table showing the influenza admissions side by side with the general average of admissions at various ages, in all 439 influenza patients being included. From it we learn that under 10 years of age the influenza admissions were 0.9% and the general average of admissions 0.7%; from 10 to 20 years, 14.7% and 8.8%; from 20 to 30 years, 40.3% and 27.5 %; from 30 to 40 years, 19.1% and 23.3%; from 40 to 50 years, 10.1% and 15.7%; from 50 to 60 years, 7.4% and 12.3%; from 60 to 70 years, 5.3% and 8.9%; from 70 to 80 years, 1.7% and 2.6%; and above 80 years 0.4% of influenza admissions as compared with 0.2% general average admissions. From this it will be observed that at the extremes of life individuals were less often attacked than those from 20 to 40 years. Auerbach found, in his statistics of 200 family attacks in Cologne, that 149, or 75% of these families were attacked. In these 235 persons were ill - 95 women, 59 men, and 81 children. The large number of women was due to the illness of the female servants. Supposing each family to be constituted of, say, 6 individuals, we find that 20% were taken ill with influenza. We have it

on the authority of Comby that in Paris only the newborn were immune to influenza, and that, on the other hand, children up to 15 years of age were attacked in the proportion of 40%, adults in the proportion of 60%. Danchez also observed an insusceptibility on the part of very young children in families in which nearly all the grown-up persons were ill with this disease. The older children seemed to be most frequently attacked at first in the majority of the schools at Bordeaux. Of the 248 male and female teachers in these 41 schools, 153, or 61.7%, were attacked by the influenza. Very few reports mention the contrary fact. As a general rule, children up to 5 or 6 years of age at any rate seem to have been but little affected, while older children were no less susceptible than adults. Among 47,000 cases of influenza treated by the medical practitioners in Bavaria, the various ages were as follows: 1 year, 1.5%; 2 to 5 years, 5.4%; 6 to 10 years, 6.6%; 11 to 15 years, 7.2%; 16 to 20 years, 11.4%; 21 to 30 years, 22.2%; 31 to 40 years, 19.3%; 41 to 50 years, 12.6%; 51 to 60 years, 7.7%; 61 to 70 years, 3.6%; 71 to 80 years, 2.0%; and above 80, 0.5%. The special incidence of the disease on persons between 30 and 50 years of age is seen in the statistics of the 2,856 influenza patients among the employees of the Bavarian government railways. There were under 30 years of age, 20.9%; from 30 to 39, 24.6%; from 40 to 49, 24.3%; from 50 to 59, 21.9%; and over 60 years of age, 14.6%. This observation was all the more interesting in view of the fact that statistics proved that the employees over 50 years of age usually suffer more from other affections. The fact that in Jena the proportion of cases in the individual age classes did not correspond with the figures met with in other places is testified to by Leubuscher. There was much less sickness in proportion among children than among adults, and this peculiarity was specially marked in very young children. He met with only 6 cases of the disease up to the end of the first year of life, and the older children also showed a remarkably low percentage of sickness. According to inquiries made of the director of the local gymnasium, only 34 scholars out of a total attendance of 230 were absent at the commencement of the school in January, this being at the height of the epidemic. In general, then, we may place the proportion of cases among children up to 12 years of age, compared with that of the adults, at 1 to 20. Comby states that, as regards the school children of Lausanne (3,421 scholars) 1,840 contracted influenza, from which it is apparent that there was a high morbidity at the school age of from 6 to 16 years. Finally we may note that Lent has collected the the following statistics of the influenza incidence on the school children of Cologne. The figures for the city itself were: Class I. - 13 to 14 years of age - with an attendance of 3,002, 1,015, or 33.8%, ill of influenza; Class II - 11 to 12 years of age - with an attendance of 5,737, 1,835, or 31.9% ill with influenza; Class III - 10 years of age - 3,701, 1,130 ill or 30.5%; Class IV - 9 years of age, 3,590 scholars, 930 or 25.9% ill; Class V - 8 years of age - 2,929 scholars, 822, or 28% ill; and in Class VI - 7 years of age - 3,388

scholars, 758, or 22.3%, ill with influenza. The public schools in the suburbs of the city gave the following statistics: Class I, 13 to 14 years of age, attendance 1,609,689 or 42.9 ill of influenza; Class II, 11 to 12 years, 2,885 attendance, 1,094 or 37.9% ill; Class III, 10 years, 1,683 attendance, 626 or 37.1% ill; Class IV, 9 years, 1,758 attendance, 552 or 31.4% ill; Class V, 8 years, attendance 1,771,502 or 28.2% ill; Class VI, 7 years, attendance 1,938,510 or 26.3 ill of influenza. Many other similar and as interesting fact can be gleaned from the statistical returns of other outbreaks.

SEX.

The element of sex does not come into prominence inthe etiology of influenza. The fact that in some cases more males are affected than females is due to their being more out of doors and more in communication with others than the latter, that is to say, they are more often exposed to the contagion than women who mostly stay at home for a large part of the day and sometimes for days together.

RACE.

There seems to be no racial predisposition to the disease, as persons of every nationality can contract it when exposed to infection under favourable conditions.

OCCUPATION.

The fact that those whose occupation compelled them to remain in the open air were first and chiefly attacked is apparent from examination of the statistics of the last pandemic of influenza. This was shown especially by Neidhardt, who studied the influenza outbreak in the Grand Duchy of Hesse. His conclusions, however, were disputed by others. Thus, the prejudicial influence of exposure to the open air was not supported by the statistics of railroad employees in Saxony. Of those who were employed in the outdoor service, 32% became ill; of those employed in the office work, on the other hand, 40%. The statistics of the local benefit societies in Plauen show that the percentage of the sick among farm hands and builders was not greater than among the members of other benefit societies who worked indoors. In Schwarzenberg the labourers in the forest, who were working in the open air all day, were affected less than others, and there was no sickness whatever in the forest districts. Lancereaux states that most of the railway men who became affected with the disease were those engaged in office work, and not those whose employment kept them continually in the open air. The following statistics, supplied by Ripperger, shows the preponderance of influenza among those working in factories: Taking first those employed in the open air of these, workmen and labourers of Niederbayern 7% were attacked; railway officials in Amberg, 9%; peasants in Niederbayern, 11.7%; and workmen in the Salzach-Correction, 20%. Then, as regards those employed in closed rooms, in the slag mills in St. Jugbert, 15% were attacked; cotton mill in Ramberg, 20%; cotton mill in Bayreuth, 33%; sugar factory in Bayreuth, 36%; aniline works in Ludwigshafen, 38.8%; cotton mill in Zweibrücken, 50%; tinware factory in

Amberg, 60%; factory in Schweinfurth, 62%; gun factory in Amberg, 70%; and gold beaters in Stockach, 80%. It is very striking also to note the proportionately small number of soldiers affected, at least in the Prussian army, where, according to the official returns, only 101.5 per 1000 of the entire forces were attacked by influenza in the 1889-90 epidemic. The manifestation of the infection in very different degrees will serve to explain the many strange instances of how individual classes of occupation fared. Thus, among the workmen on the Baltic ship-canal only those became ill who lived in the town of Rendsburg; those who had been housed in barracks outside of the city were not affected. The 438 lead workers of Rookhope, which is situated in a lonely valley in the county of Durham, all remained perfectly free from influenza during the three epidemics of 1889-92. Only 8 cases of the disease were observed in four places along the English coast in the case of the 415 inhabitants of the fifty-one lightships and twenty lighthouses. There are some occupations which are said to afford protection against the disease. Thus workmen in tanneries, chloride of lime, tar, cement, sulphuric acid, glass, and coke works are mentioned by some writers as being almost immune. But taking a all-round view of the question, it would seem that occupation and social position are only influential in so far as they bring those concerned into free communication with others probably carrying the infection on them.

METEOROLOGICAL CONDITIONS.

The seasons do not seem to have a specific influence on this disease, for it has been observed in every month of the year - more often, it is true, in the winter than in the summer. Hirsch has prepared a table of all influenza epidemics with the exception of the 1889-90 one, and if we add to it the last pandemic, we obtain the percentage of epidemics which occurred in the single months as follows: January, 14.38%; Febriary, 10.86%; March, 8.94%; April, 7.03%; May, 6.71%; June, 5.43%; July, 6.07%; August, 4.47%; September, 7.67%; October, 7.67%; November, 8.96%; December, 11.82%. The preponderance of epidemics in the winter months is made quite evident from the above. It is undoubtedly true that influenza finds then the most favourable conditions for its dissemination. It is not possible, however, to determine from this the time of origin of the disease, especially as we are ignorant of the locality and under what conditions the first case occurred. We must, of course, bear in mind also that diseases of the respiratory apparatus are notably more frequent, when unfavourable climatic conditions are present. The occurrence of diseases of the respiratory organs may be determined by unfavourable conditions of the weather in tropical and subtropical regions, and the maximum frequency of these catarrhal affections is found in the higher and highest altitudes. It is at present not possible to affirm what meteorological conditions are favourable to the dissemination of influenza, though it is certain that the state of the atmosphere has a great influence thereon. High barometric pressure, dryness of the air, absence of precipitation,

fog, will not in themselves account for the appearance of an epidemic in all cases. The only conclusion which may be permitted is that influenza may spread in all times and in all weathers; that, however, is most easily disseminated under those conditions in which the respiratory organs are most severely taxed, and therefore are most prone to be diseased. Assmann's observation is worthy of record, viz., that in the great pandemic of November and December, 1889, a very unusual drought was present in the whole of the eastern and central parts of Europe, through the latter a protective covering of snow was absent, and everywhere low-lying clouds and high atmospheric pressure were observed. Still we can deduce no hard and fast rule from this for future epidemiological anticipations.

TELLURIC CONDITIONS.

There have been some in the past who have attached a certain etiological interpretation to telluric condions in the propagation of influenza; but it is now generally believed that the same have nothing to do with the dissemination of the disease.

DUST.

The pandemicity of the 1889-90 influenza is, according to Rollo Russel easily accounted for. He points to the fact that great inundations occurred in China in 1888 by the overflowing of the Yellow River, some million and a half persons being drowned at this time and immense regions inundated. Six months later similar enormous floods occurred in Manchuria. As a result of this calamity this locality was visited by a great famine in the summer of 1889; cholera also appeared, and during the winter another plague caused great perturbation among the inhabitants. During the summer the flooded portions dried up and were covered with yellow dust, which had been deposited as slime by the Hoang-ho. The dry winds now drove this dust in such quantities that the air became full of it and the sun was obscured. The germ of the disease in this dust was propagated everywhere.

MIASM.

The miasma theory is one of the very many that have been advanced to explain the widespread character of certain influenza epidemics, and in contradistinction to the contagion theory that we shall presently consider; there are many, too, who announce a miasmatico-contagious origin of the disease. The theory of miasm is obviously based upon the presumption that the infectious micro-organism has an ectogenous existence. The studies of the bacillus of influenza make this to a high degree improbable, and the manner of dissemination of the disease would seem to be opposed to the fact that miasmatic infection is necessary. Nevertheless, it cannot probably be denied that when influenza first attacked man the germ must have been of the miasmatic nature. On this point there have been vast differences of opinion; but many observers, writing during the height of the pandemic, have deferred discussion of this question to a later period, holding that a decision could be arrived at only after the bacillus of influenza had been isolated and its

characteristics have been demonstrated; and now, after we have discovered the germ of the disease, the opinion again finds expression that we ought to return to the practical study of the pandemic mentioned. Furthermore, some observers, as stated, are believers in a miasm, others are contagionists, and a third group lean to the theory of the miasmatico-contagious nature of influenza. In the latter mode of infection there is still another subdivision made, according as the germs are believed to produce their effect chiefly by direct transmission or contagion, or to act as a miasmatic poison. The existence and propagation of the germ outside of the human body must be understood by the term miasm. In the strictest sense, a miasm can pass into a human being only from its place of abode; each germ which causes a disease must have obtained its infecting qualities outside of the body, and as a matter of fact must have originated there also. If we adhere to this definition of the miasmatic poison, it appears very evident that a dissemination of influenza could only exceptionally have taken place in this manner. There are an overwhelming number of cases that can be adduced in proof of the theory of contagion or carrying of the bacillus influenzae from one place to another by individuals having intercourse the one with the other.

CONTAGION.

The question of the contagiosity o f influenza was much studied and debated during thr last pandemic; and we now know that the disease is highly contagious and extends by direct or indirect communication from the sick to the well. Until comparatively recently the view was almost universally held that the cause of the disease was miasmatic in its nature and spread independently of direct contact. It is interesting to note in this connection that Haygarth, writing of the outbreaks of 1775 and 1782, declares as the result of his observations that the influenza spreads "by the contagion of patients in the distemper"; and Falconer, writing of the epidemic of 1803, says, "I have no doubt that it is contagious in the strictest sense of the word." I mention these facts in order to show that the idea of contagion has by no means been dependent upon the discovery of the bacillus influenzae for its origination, as many have supposed. Not only can the sick propagate the disease, but the healthy apparently, as a person may have only the symptoms of a slight catarrh, and yet be suffering from influenza, and also it is possible for one to carry the germ about in his person a long time after convalescence. Furthermore, influenza may be spread by inanimate objects, that is to say -

Fomites.

This idea, however, is not always easy to establish in certain cases, as obtains also of the hypothesis of the propagation of the disease by healthy individuals bearing the contagion. As an example of the latter may be mentioned the case of a medical practitioner in Sachsenburg who was said to have introduced influenza into the prison. He began treating a patient suffering with influenza at another place, on December 19th, and

onthe 20th and 24th made his medical rounds in the penitentiary named. On December 26th the first symptoms of the disease were observed in a few prisoners. In support of the theory of infection by inanimate objects, an example occurring in the French navy may be mentioned. An officer of the ship "La Bretagne", which was anchored, in December 1889, in the harbour at Brest, became ill at his home in Brest on December 11th, three days, it is said, after the arrival of a number of packages from Paris, which were first unpacked by the officer in question. These packages then carried the disease to his ship, while the infection spared the vessels "Borda" and "Austerlitz", which were anchored beside the ship "La Bretagne". Another interesting example is afforded by the invasion of the station at the St. Gothard hospice. The watchman who was employed at this hospice during the winter had been to Airlo where influenza extensively raged, and after a visit of some duration returned from here to the hospice. During the month of January not a person ascended the mountain, except this watchman; he remained perfectly well himself, but the other watchman, who had never gone down to the valley at all, became ill with influenza. In this case the infection seemed to have been carried in the clothing. Bäumler says that the first case of the disease in Basle occurred in a person who had been enaged in unpacking a bale of mechandise, which had recently arrived from a greatly infected locality at a considerable distance.

Instances of Direct Contagion.

There are innumerable cases on record in which the evidences of direct contagion of influenza are beyond dispute, and the following are a few of the best known. Thus we read that the populace of Rosenberg, in the district of Heiligenheil in Königsberg, traced the origination of their epidemic to a sailor returning from Dantzic. In Lubeck, the first case was with certainty traced to the porter of an hotel, who had been in close communication with various patrons of the house; his illness was followed within a few days by that of ten of the servants. In Hadersleben in Sleswick, a Swedish steamer hailing from Dantzic brought the first patients, from whom the influenza rapidly spread. In two of the districts of Silicia two persons arriving from Hamburg were proved to be the carriers of the influenza bacilli. In Kiestrup, a soldier on furlough arrived from Flensburg on the 20th of December, and became ill on the 22d; his illnes was followed by that of his mother on the 23d, she being the first one in the village to have influenza, and on the same day his father also sickened. The first case in Silesia was that of a student who had arrived from Kiel, which was already infected, on the 15 th of December; the second was also that of a student, who, on the 17th of December had arrived from the infected Leipsic. A lady who had arrived in Strasbourg from Paris was taken ill in an hotel; a servant in this house was the first person to have influenza in the city. In the village of Elbersdorf a recruit absent on leave, in Wurzbach a pharmacist who had come from Erlangen, in Muhlberg a man from the neighbourhood of Gera, which has

been infected for two weeks, were ascertained with certainty to be the first cases of the disease and the sources of further infection. In Lucka the first patient suffering from influenza was a traveller from Berlin; after him the family of the hotel-keeper with whom he lodged became ill, and only after this were cases of influenza noticed in the village. In Zeulenroda a merchant sick with influenza arrived on the 20th of December from Berlin; the first cases in the village appeared in his family, and after that other persons were attacked in the village. In Meisenheim in Coblentz butone house, situated on a farm where there lived only a few families in isolated houses, to which a soldier returning from his garrison brought the disease, was visited by influenza; all the members of the family in this house, but no one in the other houses, fell ill with influenza. The latter affection in the governmental district of Frankfort broke out simultaneously in the families of two large landed proprietors who lived miles apart in the country, but who had both been in Berlin about the same time, and had come into contact with persone suffering from influenza. The members of a family, living altogether secluded in the country near Königsberg, became ill with influenza forthwith on the arrival of a visitor from that city which was infected at the time. A merchant of Eubingheim in Baden, who a few days previously had been on business in Mannheim, where influenza already prevailed, became ill with the disease on the 23rd of December; on the 24th of that month his wife and two children became ill - these three patients were the first cases in Eubingheim; after this it required only a few days for the disease to overspread the village. In the neighbourhood of Boxberg in Baden, the son of one of the tenants was taken with influenza in the garrison at Würtzburg, and came home on leave of absence; two days later all the members of his family became ill with influenza in short succession; the farm itself and the entire district had up to that time been entirely free from influenza. An old gentleman was the first one to have the disease in Ettlingen; he had returned from Berlin four days previously, after a visit of four days, and fell ill with influenza on the 11th of December. Three days later his daughter, who had nursed him, became ill, and three days after this second illness the female servant of the house. The latter was taken to the hospital, and was placed in a ward where another girl lay, who was suffering from some slight surgical affection. Undoubted symptoms of influenza were observed in this other girl on the third day following the reception of the patient bearing the disease. A place in the district of Saarburg, aside from the main routes of travel and many miles distant from any town, and whose inhabitants had but slight intercourse with the neighbourhood, remained altogether free from the disease during the true influenza epidemic. In the middle of February, when the scourge had already died out in that part of the world, a servant from one of the mountain villages in which influenza was still raging arrived at the domain first referred to. This

man became ill on the day following his arrival, and influenza attacked four other servants, who lived together with the patient in the same dwelling, four days later on. The records of the German army also furnish some interesting examples, and a few of the most significant merit reproduction here, and the more so as the conditions of intercourse could be much more closely observed among the soldiers than is, as a rule, possible amongst the civil population. In No. 8 Company of the 137th Regiment, which had its headquarters in one of the fortifications of Strasbourg, the first case of influenza was reported on January 4, 1890, while the other companies of the battalion, which was in garrison in Strasbourg itself, had already been visited by the disease on December 24 and 28 of the previous year. The first case in the fort was in the person of the orderly sergeant of the company, who daily visited the city for the purpose of distributing the parole, and who had had intercourse with influenza patients. From this time the epidemic spread throughout the fort. An artilleryman of the 13th battalion received a pass to Tübingen, and there visited relations who were suffering from influenza; on his return he met a comrade of his battalion. Both of these were the first ones of the battalion who were taken ill with influenza; a third case followed in the barrack of the soldier first infected. On the following day there occurred 13 cases of illness in the infected barrack, and th ree in the room which had been first infected. A cavalry captain of the garrison at Pasewalk returned home from Berlin suffering with influenza; nothing was known of influenza in the village at that time. After the captain the chief staff physician, who had been treating him, became ill, and then the sergeant of cavalry of the squadron, whose presence the captain of horse had commanded. Next the wife and child of the chief physician of staff, and a gentleman with whom the latter had business, were stricken down with the disease. From now the affection became widespread.

Irregular Instances.

In spite of the above and innumerable other cases which prove the contagion theory to the hilt, it is also to be mentioned that there have been many outbreaks in which the evidence of direct contagion is wanting. The traditions of former epidemics also are that influenza was characterised specially by the rapid spread from one country to another, and by the sudden appearance of the disease in isolated places. This belief was seemingly strengthened in the great epidemic 1889-90, as the sudden appearance at isolated spots was so striking that it was thought the germs of the disease had suddenly descended like a cloud out of the higher aërial strata. When it was known that a number of cases of influenza had broken out in one place or another, and other villages which were situated near by had been spared, the impression was produced that the germs of the disease had fallen to the earth in local showers, as it were. When, however, we analyse more carefully the beginning of the individual cases of illness, we are convinced that the disease was introduced in every

instance by human beings coming from an infected locality. When once the disease was introduced into a place, it often spread with great rapidity, but a lightning-like diffusion, such as is often described, has really never been observed. The appearance of the epidemic almost at the same moment amongst a vast number of inhabitants of a city can only be explained by the fact that there were many single foci, and that the inf-ection spread from each of these many centres simultaneously. There are very few nowadays who deny this supposition.

Influenza at High Altitudes.

Many interesting examples of this are on record, and one of these may here be mentioned. Thus, we have it on the observation of Bäumler that influenza broke out in the inn onthe Felsberg in the Black Forest, no less than 4,150 feet above the level of the sea. The proprietor of this establishment had acquired the disease himself in Freiburg, and brought it home with him. Then his sister, who was nursing him, fell ill; then the maid-servant, who nursed the latter; but there was no influenza observed amongst the male servants who worked outdoors and the rest of the household who took care to keep at a distance from the sick-room.

Influenza in Institutions.

Influenza is frequently observed in prisons, monasteries, and other institutions. Thus, Kirn tells us that in the state prison at Freiburg, of 310 prisoners in cells, 30% became ill; of those working together in the general workrooms and in the hospital 50%; and 70% of the servants who in part lived in the city. Dealing in his report with the female prison at Cologne, Vanselow mentions that the first case of influenza was that of a female watcher who had spent two days away from the prison. Her assistant became ill two days later, and the epidemic then rapidly increased in the prison. In the insane asylum at Erlangen there occurred for the first eighteen days cases of influenza only amongst the staff who had come in contact with the outer world, but the patients afterwards developed symptoms of the disease. In this case we observe, as in others, that amongst the inhabitants of closed institutions those were first attacked who were in communication with the outer world. In monasteries this is particularly noticeable; those which were strictly isolated from the outer world escaped the scourge even in the midst of an infected city. In Luoco Pio Trivulcio in Milan, containing 480 inmates, there were only 4 cases of the disease; on the other hand, 8 cases occurred among the 30 servants. Influenza did not trouble, according to Alancisi, the houses and prisons of the inquisition during the epidemic of 1708.

Influenza at Sea.

In the case of influenza breaking out on board of ships on the high seas, it can usually be proved that it did so only after one or other of the crew had been amidst infection on land, the affection manifesting itself within the prescribed period of incubation. There are numerous instances on record, one of the best-known being that of the "St. Germain", onboard of which a passenger who embarked at Santander brought the disease

with him, which then affected more than 47 of the crew and 154 passengers. The epidemic seems to have originated at Stockholm in the middle of November, 1889, and from thence spreading first to the places which are connected with it by railway. On the 20th of the following month, the epidemic had visited a hundred and eight out of a hundred and twenty-nine places on the railway, i.e., 84%, but only forty-seven out of ninety-four places without railways, i.e., 50%. In no case was the dissemination quicker than the intercourse of man. We have noted in favour of the miasmatic nature of the disease that persons became ill under such circumstances as seemingly made direct contagion impossible. One of the best-known instances of the kind is the event of April 3, 1833. The disease was then raging in Devonshire, and while the frigate "Stag" was near this coast, it was driven back by a wind; within half an hour, it is said 40; after two hours 60, and on the following day 160 cases of influenza occurred amongst the crew. Nevertheless, it is possible in this case that the pilot may have been the means of communication with the infected land.

SUMMARY.

In dealing with the predisposing causes of influenza we have seen that the affection, when falling upon a large community, attacks a large proportion of the population without distinction of age, sex, social conditions, or occupation. Previous illness affords no protection. Aged and infirm persons and those of nervous temperament are peculiarly liable to suffer, but the robust possess no immunity. All races and dwellers in every clime are liable to attack. Upon the outbreak of an epidemic adults are attacked earlier than children. A slight relative immunity has been observed in certain outbreaks in the case of children. The disease is not self-protective. An attack confers no exemption from the affection in sunsequent outbreaks, and independently of relapses, which frequently occur, individuals have been known to experience a second attack during the prevalence of the same epidemic. Local unhygienic conditions favour the prevalence of the disease in its more severe forms, and the increase of the death rate during outbreaks is proportionately greater in districts in which there is ordinarily a high mortality as compared with healthier places. Influenza bears no relation with known atmospheric conditions. It prevails in all seasons of the year, and is in no way dependent upon low temperature nor abrupt changes of weather. It has prevailed in very high latitudes and at all altitudes. Epidemics have occurred at irregular intervals. It was at one time thought that the disease recurred in cycles of about 100 years. This view is unsupported by facts. A review of the history of the subject shows, however, that at intervals of 25 to 40 years great epidemics have swept over vast areas of the earth's surface, while more limited outbreaks have occurred with greater or less frequency in the years succeeding the pandemics. In spite of all this, however, one cannot establish a periodicity for the disease anywhere. In the vast majority of instances the great epidemics have spread in a direction from the

east or northeast towards the west and south. On other occasions they have taken the opposite course, and sometimes they have appeared to radiate in various directions from several centres. In consequence of these facts two views have arisen concerning the origin of the affection: First, that each epidemic starts out from some single unknown source and spreads thence from point to point, invading more distant localities successively as it advances, until at length it dies out in regions remote from the starting point. It in no wise conflicts with this view that outbreaks recur from time to time in the regions thus successively invaded. The second view is that influenza arises not from some single particular place, but that the infecting principle is widespread in nature, and called into activity from time to time by unknown atmospheric or telluric causes, and that the great epidemics have many points of origin and are constituted of successive outbreaks of the disease. We have also seen that the progress of this affection from place to place has usually been rapid. In this respect, however, the epidemics have shown great diversity. The disease has sometimes travelled slowly. It is said to have overrun Europe in six weeks, and on other occasions it has occupied six months in doing so. It has sometimes attacked regions widely remote from each other within short intervals of time, and has appeared at the same time in different quarters of the globe. A careful study of the facts relating to the 1889-90 pandemic shows that influenza follows the lines of travel and advances at about the ordinary rate of commercial intercourse. The mere fact of the disease, first noted in Central Asia in the spring of 1889, extending westward towards Europe and eastwards towards China serves to explain its simultaneous appearance in distant quarters of the globe. The well-established fact that the infecting principle may be transmitted by fomites renders intelligible at least the occasional outbreaks at sea and at distant points where the affection has not in the ordinary way prevailed. The disease continues to rage, as a rule, from four weeks to two months, exceptionally for a much longer period, when it develops in a community. The epidemic of 1831 was continuously prevalent in Paris for nearly a year. The epidemics are occasionally heralded by scattered cases. More commonly the disease attacks almost simultaneously great numbers of inhabitants of infected districts, so that when the epidemic is severe the sick may be soon counted by thousands and business is sometimes seriously interfered with. The epidemics rapidly reach their height, and usually subside almost as suddenly as they began. During the prevalence of the disease since the winter of 1889-90 scattered cases and groups of cases have occasionally occurred in the intervals between the recurring annual outbreaks. In large cities the disease makes its appearance nearly at the same time in several different localities, and spreads from these as foci of infection throughout the entire community. Cities and large towns are usually affected earlier than the villages round about. We have likewise noted that the study of the last-mentioned epidemic once and for all settled the question

of the contagiosity of influenza, rendering it no longer in doubt. Nowadays every one regards influenza as highly contagious, and as extending by direct or indirect communication from the sick to the well. Until within comparatively recent years the theory was almost universally entertained that the cause of the disease was miasmatic in its nature and spread independently of direct contact. Haygarth's affirmation of contagiosity, made so long ago, nearly 150 years, is interesting in this connection. We have shown that influenza may be spread by inanimate objects, the belongings of a patient constituting fomites, or the dead body of the latter may prove infective, as was shown by White and Guitéras in connection with a localised outbreak in a remote community in 1880. "Influenza", they say, "prevailing in Europe, an American gentleman in bad health contracted the disease in London; improved; suffered a relapse in Paris, and died there at the end of September, 1879. His body was embalmed and sent home. Following the exposure of the remains of this person to the view of his family there was an outbreak of influenza with characteristic symptoms which affected, first, members of that family; next, friends living in close association with them; next, the medical attendant of some of them; and finally, the housekeeper and one or two patients of one of the physicians who wrote the paper; the whole numbering some 20 cases. Finally, it may be noted that the organism discovered by Pfeiffer in all true cases of influenza examined has placed the disease upon a sure nosological foundation, and enabled it to be ranked among the several affections produced by a specific bacillus. The various points in connection with this interesting micro-organism we shall now consider.

THE EXCITING CAUSE - THE BACILLUS INFLUENZAE. PFEIFFER'S BACILLUS.

HISTORY.

Long before ~~before~~ Pfeiffer discovered the specific germ of influenza, various researches had been from time to time conducted with this object in view, and it would seem that his microbe has been actually observed by some of the earlier bacteriologists but not recognised. Thus, Vanselow, during an epidemic at Cologne, often saw and demonstrated in microscopical preparations the small germs in question, and in 1890 Danco made a similar observation. About the same time Babes examined, in Bucharest, some influenza patients and the bodies of dead subjects. Although complications were present in most cases, he was able to demonstrate that in the greater number of instances exceedingly fine diplobacteria and short bacilli predominated in the expectoration. He noticed them within the cells and also in large numbers outside of them, and subsequently affirmed that he at that time had seen, and described as predominating in the sputum, the micro-organisms bearing Pfeiffer's name. At this time Kirschner came across small organisms in the sputum, which he had not known before, and which since then he had never failed to find in any bronchial secretion derived from influenza patients. He interprets it as a diplococcus, decidedly smaller than the staphylococcus pyogenes and the streptococci of suppuration and

of erysipelas. Enormous quantities of very slender bacilli were found by Pfeiffer, in the spring of 1890, by staining Kirschner's preparations with carbol fuchsin. This fact gave a clue to Pfeiffer as to the direction his future researches should take; and when, on November 30, 1891, the first cases of influenza were diagnosed in the wards of his institution, he forthwith made many preparations from the sputum of the patients. Again the slender bacilli were found in enormous number. Thus it was natural that his attention became concentrated upon this micro-organism. He started with the hypothesis that the disease may spread over the world in the form of a pandemic in a style unapproached by any other infectious malady. Consequently, if influenza is due to a living germ, - which could be presupposed with certainty from the analogy with all other known and better understood infectious diseases, - this organism must be active in large quantities and great concentration during the epidemics. The undoubtedly contagiousness of influenza rendered it probable that the contagium must stand in intimate relation to the patients and that attention should be directed particularly to the expectoration; for this was suspected as the vehicle of the virus of the disease, in view of the marked tendency of the affection to give rise to catarrhal troubles in the respiratory organs. Indeed, the sputum in this malady has a number of peculiarities. Thus, it is greenish-yellow in colour, viscid, and adhesive, and while in the slighter cases it is derived from the nasopharynx, a considerable portion is furnished by the bronchial ramifications as soon as the process has extended to the bronchi or to the pulmonary tissue. As the secretion from the nasopharynx is contaminated with very numerous species of bacteria, Pfeiffer examined in particular the sputum coming from the bronchi, and this always when quite fresh, immediately after its expulsion. He spread the masses carefully in sterile glass dishes and removed from the middle the purely purulent portions. For staining he employed Loeffler's alkaline methylene blue solution, but obtained the best preparations with a very dilute, pale-red solution of carbol fuchsin in water. As the stain penetrates very slowly, he allowed the cover-glasses to float for at least five or ten minutes on the surface of the solution. In this way Pfeiffer obtained preparations in which the cell nuclei and the bacteria were stained most intensely and still distinctly, while the cell protoplasm became rosy in hue and the ground substance remained perfectly devoid of coloration.

MORPHOLOGY.

For diagnostic purposes it is very necessary that one should be thoroughly conversant with the morphological characteristics of the influenza bacilli, which are to be seen in enormous numbers in all recent and complicated cases in almost pure culture in preparations of sputum of the patient. The bacilli are situated mostly in the form of nests and swarms in the mucous ground substance of the sputum. They are also found in greater or smaller number in the protoplasm of the pus cells, where they are grouped around the nucleus, without ever

penetrating into the nuclear substance. The influenza bacilli have not quite the transverse diameter of the bacilli of mouse septicaemia. Their length, as a rule, is only two or three times their width, though occasionally we discover in the sputum and sometimes in pure cultures longer forms that are to be regarded as short filaments. In older pure cultures of from three to four days' duration very long filaments may occur; but these are abnormal forms, the first signs of beginning involution. The ends of the influenza bacilli are rounded. Very often we find two particularly short bacilli in close apposition. These are forms of division that are apt to be interpreted as diplococci and undoubtedly have been mistaken for them. The influenza bacilli have no capsule and in a hanging drop exhibit no spontaneous motion. They do not react to Gram's stain. It will be observed that the poles of the bacilli are more deeply coloured than the middle portion, in rather faintly stained preparations.

STAINING.

We have just seen that Gram's stain is useless for the demonstration of the influenza bacilli. The best tinctorial agent for employment with dried and fixed cover-glass preparations of sputum is a dilute solution of fuchsin or carbol fuchsin, that is to say, Ziehl's solution twenty times diluted, - this being allowed to act, according to its concentration, for about ten minutes. The influenza bacilli can also be made visible by other well-known aniline dyes, but not according to Gram's procedure. These bacteria are undoubtedly among those stained with difficulty; moreover, they are the smallest thus far cultivated. Their typical demonstration is forthcoming from the examination of sputum of recent influenza bronchitis; and it will then be observed that their thickness, when they are well stained, corresponds about to that of the bacilli of hog erysipelas or mouse septicaemia, but their length is much less. The individuals arranged in pairs greatly resemble the diplococcus lanceolatus; when faintly stained the individual bacillus may also show a vacuole in the middle, thus presenting the appearance of a diplococcus. Longer forms and even filaments composed of several bacilli are met with. Furthermore, there may be observed a certain variability in the transverse diameter, so that some individuals now and then hardly differ in size and form from the diplococcus of pneumonia. In general, however, these two species of micro-organisms cannot be mistaken for each other. In typical cases the influenza bacilli are so uniform in size and are present in such enormous numbers in the sputum that it is easy enought to diagnose the disease by bacteriological methods. Their darker colour and their greater thickness forthwith pronounces any stray diplococci to be other than the bacillus influenzae.

CULTURAL CHARACTERISTICS.

Pfeiffer experienced at first very great difficulty in cultivating his bacillus, as neither in gelatine nor on agar plates, neither aerobically nor anaerobically could he obtain colonies from the bacillus seen under

the microscope.He invariably experienced failure until he spread the sputum or pus from the lung directly upon agar;then at the temperature of the incubator there developed extremely delicate,transparent colonies,only visible through a lens,which were densely ccrewded over the entire surface of the nutritive medium.But it was impossible to effect the propagation of the bacilli on transplanting the colonies from the first medium either upon agar,even under the most varied additions and with different degrees of alkalinity,or upon blood serum or into bouillon.But Pfeiffer noticed that the growth of the influenza bacilli did not succeed even in the first generation when the nutritive medium transferred with them had been largely diluted,or when the material containing the bacilli had been washed with sterile water. NNt until he caught blood in sterile vessels,placed it drop by drop upon the surface of obliquely congealed agar tubes,and with it rubbed up a trace of influenza sputum did innumerable colonies of the bacillus develop and flourish.In this way it is easy to obtain the organism in pure culture.Even in the oldest cultures no further adaptation to saprophytic conditions of life have been discovered,so fundamental is this characteristic of the influenzal microbe.Pfeiffer then made further researches to determine which constituents of the blood contain the substances necessary to the growth of the bacilli.The blood serum,when free from cells and clear, does not contain them,so that the material required must be present in the red corpuscles.From these he obtained a solution of the haemoglobin by repeated freezing and thawing or by agitation with ether.After evaporation of the ether he passed the very dilute haemoglobin solution through a filter bed of silicious earth.In this way he obtained a clear almost chemically pure solution of haemoglobin in 0.6% solution of sodium chloride.When a drop of this was placed upon agar and then inoculated with influenza bacilli the colonies developed as plentifully as in the entire blood.This made certain the fact that the first cultures which had succeeded directly with the fresh material owed their development to the haemoglobin which had been added in traces.It is not true that the haemoglobin acts in the cultivation of the bacillus influenzae as the carrier of oxygen,which element is urgently required by these organisms,and for the reason that Pfeiffer found by experiment that carbon monoxide haemoglobin,which can neither absorb nor give off oxygen,also favours the growth of his bacillus..Even blood agar which has been heated for an hour to 70.C.considerably favours the development,and the latter can likewise be effected by haemoglobin coagulated by boiling.Having tested human blood in this way,he made use of that of various animals,e.g.,rabbits, guinea-pigs,pigeons,and fish,and found that the same specific effect was produced in each.This he considers due to the fact that the red blood-corpuscles of pigeons break up readily and contain haemoglobin in large quantity.If we use blood-agar,the bacilli form colonies in minute droplets;when they are closely crowded they are visible only under a lens,though when they are further apart and few in number they may attain a

considerable size, but even then not exceeding the diameter of the head of a small pin. The droplets have no tendency to coalesce. When neighbouring colonies merge, the outlines of the several droplets always remain distinct. Histologically they appear almost devoid of structure, possessing a remarkable and glassy transparency. Pfeiffer's bacillus is absolutely aërobic in character. He was able to secure a plentiful growth in bouillon mixed with blood or spread out in very thin layers. Degenerated forms, that are scarcely recognisable as bacilli, develop in an atmosphere of hydrogen, and as minute and sparse colonies. The bacilli require for their development a rather high temperature; at that of the incubator it requires twenty-four hours in the case of pigeon's blood for the acme of their development to be attained. At 43. C. no growth occurs, though the bacilli do not die at this temperature, and the limit of lower temperature seems to be from 26. to 27. C., at 30. growth being still luxuriant, at 29. retarded, and at 23. or 24. C. development is impossible. From the results of various researches it appears that the bacillus influenzae die very quickly in drinking water. When a platinum loop containing a fresh culture is agitated in sterilised tap-water the number of living bacilli after twenty-four hours at the temperature of the room is, in the dark, very small; the whole is sterile after thirty hours. On the other hand, however, the vitality of the bacillus in bouillon is considerable, death not occurring until about fourteen or eighteen days either in the incubator or in the room. The virulence probably continues for at least a fortnight, as it is possible that the duration of the life of the organism is the same in the sputum of the patient. Desiccation speedily kills it. To test the point the discoverer of the bacillus placed samples of recent blood-agar cultures together with the surrounding blood on sterile glass surfaces, by means of a platinum loop, and allowed them to dry there. From time to time particles of the dry mass were scraped off and again inoculated upon blood-agar. In proportion as the drying was sudden the death of the bacilli was rapid; when the drying took place at 37. C., the colonies became much scantier even after from five to ten minutes, and after one to two hours all the bacilli were dead. At the temperature of the room the culture experiments often became negative after eight hours. After twenty-four hours all the bacilli were dead. Quite similar results were obtained in attempts to cultivate the bacilli from dried influenza sputum. Fresh sputum furnishing numerous colonies gave only a few when dried for twenty-four hours, and none at all after thirty-six to forty hours. The possibility of the ectogenous growth of the bacillus influenzae is a point which has received considerable attention at the hands of Ripperger, who endeavoured to prove it indirectly but without success. The problem of the persistence of the organism of this disease was determined by its discoverer. Its slight resistance to drying, its death at a temperature of 60. C., or after the addition of chloroform, are points positively against the existence of spores. Furthermore,

upon microscopical examination of recent sputum and of pure cultures, nothing was discovered that could be taken as proof of spore formation. Consequently, it is impossible for the bacillus to develop outside of the body in the ground or in water; the contagion, as a rule, is conveyed by the recent, still moist secretion from the nasal and bronchial mucous membrane of persons suffering from the disease; and the dissemination of the affection by dried and powdered sputum can occur only to a very limited extent. If we desire to secure pure cultures of the influenza bacillus, it is necessary that the bronchial secretion, or juice from portions of lung infiltrated with the bronchopneumonia of the disease, befirst finely divided in 1 or 2 c.c. of bouillin until a uniform and only slightly turbid emulsion results. This preliminary dilution has two objects. In the first place, in the succeeding inoculation the number of the transferred germs is sufficiently diminished, so that separate, well-developed colonies may form. Secondly, the haemoglobin present in the original material is largely diluted, so that the growth of the bacilli upon media not previously prepared with blood is completely inhibited. This emulsion is transferred by means of platinum loops to blood-agar and, for the purpose of control, also to ordinary or glycerine agar, and distributed as uniformly as possible over the entire surface. The test-tubes are then placed in the oven. After twenty-four hours the colonies are seen upon the blood-agar as densely crowded transparent droplets, which under the microscope are seen to be composed of very delicate bacilli; while the control tubes either remain sterile or contain merely scattered colonies of other species of bacteria associated with Pfeiffer's organism - usually the pneumococcus or streptococcus. Another method of cultivating this organism is that devised by Nastinkov. He began with the idea that the yolk of hen's eggs was chemically very similar to blood, in that it contained ferric oxide, potassium salts, and phosphate combinations, and that the iron in the blood as well as in yolk of eggs existed in the form of complicated organic compounds. In order to obtain a particularly transparent nutrient medium he dissolved the yolk in alkaline distilled water, the proportion being five grammes of a 10% solution of caustic soda to one litre of distilled water, to which faintly alkaline fluid 100 c.c. of yolk is added. The yolk is freed from the surrounding albumin by rolling it over blotting-paper. The yolk solution thus prepared is placed for about two hours in a steam-steriliser, and on the following day when the liquid has settled it is filtered, poured into test-tubes, and sterilised in the usual way. In the test-tube the solution appears greenish with reflected and yellow with transmitted light. The following is the mode of preparing a 1% yolk-gelatine: Take one litre of the yolk solution and fifteen to a hundred grammes of gelatine, boil until completely dissolved, and replace the evaporated water. The opaque mass thus resulting is passed through a filtering apparatus of suitable design, and, if desired, meat peptone, etc., is added. The method, however, is not always certain and is not now much used. The following is the best method for the cultivation of the bacillus influenzae in connection with pigeon's blood. The bird is held firmly, one wing is

lifted up, and the small feathers are plucked from the axilla. At the point where the large vessels are visible the skin is washed with a solution of corrosive sublimate, sterilised cotton wool being used for the purpose. Alcohol is then rubbed in, and the surface thus made perfectly clean and germ-free. The vein is then divided with small pointed scissors and a sterile test-tube is held so that the drops of blood fall directly into it before they touch any other part of the skin or the feathers. When about 1 c.c. of blood has been collected in this manner, it is well stirred in the bottom of the test-tube with a platinum loop previously heated and allowed to cool. The blood is thus defibrinated, and is then spread from the tube upon agar plates or upon obliquely congealed agar surfaces, by means of the platinum loop or a platinum brush. This is a troublesome procedure, and the difficulty of preparing a fresh culture medium often prevents the bacteriological examination, because the inoculation from the fresh sputum cannot be made rapidly enough. It would be well, therefore, if the fresh blood could be dispensed with. To this end Voges prepared media with blood taken from men by cupping and preserved upon ice, and he prefers this medium to any other in vogue. The blood is kept upon ice, thoroughly agitated the serum with the clot, a few drops placed in a Petri dish, liquid agar at 100. added, mixing performed, and cooling of the mass allowed. In addition to the technical difficulty, the admixture of blood with the media has another disadvantage, viz., that a number of plates or test-tubes are always unfit for use. Despite every care and practice, contamination cannot always be avoided. Huber endeavoured to overcome this drawback by using Hommel's haematogen instead of the haemoglobinm and he describes his method with its advantages as follows: Haematogen is a dark reddish-brown, turbid liquid with an aromatic odour and taste, and having a neutral reaction. When mixed with agar it proves to be not free from germs, and when the attempt is made to sterilise it in a current of steam it coagulates, forming thick, opaque, brown lumps. On the addition, however, of potash lye until the reaction is strongly alkaline, it is possible to secure a preparation that remains fluid at 100. C., and, having been freed by filtration from the few albuminous substances precipitated by heat, keeps clear even after repeated steam sterilisation. The dark blood-red, germ-free fluid thus obtained is then added to the liquified agar by means of a sterilised pipette, about 0.5 c.c. for each tube, but not before it has cooled to 50. or 60. C.; for at higher temperatures, owing to the lessened alkalinity following the dilution, coagulation again occurs. In this way is obtained a perfectly transparent, blood-red nutrient medium, upon which the influenza bacilli flourish and upon which they have been cultivated uninterruptedly to the seventh generation. The growth is decidedly slower than upon blood-agar; only rarely in from one to two days, usually not until from three to five, and sometimes not before from eight to ten days after inoculation, do we observed on the obliquely congealed surface those small, round, typical, non-confluent, clear water-like droplets, usually

visible only with a lens, which represent the colonies. These, moreover, grow but slowly and slightly thereafter, and either never or only after a very long time do they reach a size, enabling them to be recognised with the naked eye, as they do, for instance, upon agar prepared with pigeons's blood. On the other hand, their duration of life is materially increased. Our author was able successfully to inoculate haematogen-agar cultures, 35, 38, and 40 days old, whereas according to Pfeiffer's observations blood-agar cultures are usually dead after from fourteen to eighteen days, and a transfer to a fresh medium appeared desirable every four or five days. Pfeiffer's bacillus flourishes also in haematogen-agar stick cultures, in spite of its marked need of oxygen. Here, too, the growth is slowed, however; for a fine gray shadow appears in the depression at the earliest after two or three days, usually not until five or six days, and often very much later. This shadow increases quite slowly in density until it appears in the red medium as a dark streak which, examined with a lens, is set with round bosses and resembles a young typhoid stick culture, aside from the difference in colour. The duration of life of the bacilli is thus still more increased; Huber inoculated four such cultures without a single failure after 20, 35, 42, 47, and 67 days. Consequently, in the bacteriological diagnosis of influenza blood-agar unquestionably is to be preferred to haematogen-agar, owing to the slight energy of growth of the bacilli upon the latter; but for experimental investigation the new medium, especially the stick culture which it renders possible, seems to be particularly suitable on account of the prolongation of the life of the colonies which it allows. Our author concluded that oxyhaemoglobin was not present in his haematogen-agar, at least not in appreciable quantity, after performing spectroscopic examinations as suggested by the beautiful blood-red colour of the nutrient medium. This finding may serve to corroborate the fact ascertained by Pfeiffer, that, - probably on account of its containing iron and not through its carrying oxygen, - the haemoglobin is the indispensable factor in the development of influenza colonies. For this latter the haematogen medium may also be prepared with soda lye, by which it acquires a yellowish-red colour. But, as a rule, so many crystals form within and upon thesurface of the agar that the recognition of the colonies becomes far more difficult. The bacillus likewise cannot be conveniently cultivated upon haematogen bouillon. Special cultivation experiments have been conducted by Richter with other media than that devised by the discoverer of the specific bacillus of this disease. He could demonstrate a feeble growth upon agar coated with sterilised sputum, sterile bile, or the yolk of pigeons' and hens' eggs. The development was rather luxuriant upon pus when mixed with blood and sterilised by repeated heating to from 60. to 70. C., but not upon gonorrhoeal pus treated in the same way. Methaemoglobin still containing some unchanged oxyhaemoglobin was also used with success. Haematin solutions prepared after Caseneuve's method proved unsuitable. Richter also found

the yolk cultures recommended by Nastinkov entirely unappropriate. Curiously enough, he obtained but a feeble growth by the use of Hommel's haematogen after the above-described method. His culture experiments also failed when he added veratin; and with reference to the use of Pfeiffer's blood-agar, Richter tells us that it is absolutely necessary that great attention to detail be observed and that sufficient alkalinity must be allowed. In the same year that the discovery of the bacillus influenzae was announced, Kitasato made special researches to find out whether it was possible to obtain pure cultures of tubercle bacilli directly from the sputum of tuberculous patients, and succeeded with a method suggested by Koch. To this end the patients were directed to expectorate freely, also directly, into sterilised double dishes the sputum raised by true cough, not by hawking. A portion of the sputum is then immediately isolated with sterilised instruments and carefully washed in at least ten successive dishes filled with sterile water. In this way it is possible to eliminate nearly all the other bacteria which have become mixed with the sputum in its passage through the oral cavity. In the last dish the sputum is torn apart under sterile water, and from its midst a portion is taken for microscopical examination and for inoculation upon agar. He says that the same method suffices for obtaining rapidly a pure culture of influenza bacilli. Such cultures have a specially characteristic appearance. On obliquely congealed glycerine-agar the several colonies manifest themselves as extremely minute points resembling drops of water, which in the first twenty-four hours can be recognised only with a lens, so that on macroscopic inspection such a tube is hardly to be distinguished from a sterile one. Similar cultures have been propagated by our author for ten generations. Numerous small colonies always develop upon the moist agar surface. What is especially notable about them is that they always remain separate, never coalesce, and never form a coherent layer. This is so characteristic that it is alone sufficient to distinguish the influenza bacilli. Some have affirmed that he was deceived by a similar bacillus, as the above results have not always been forthcoming. In any case it is of capital importance that, for the diagnosis of the disease, the nutrient medium employed should cause the development of the bacilli without any doubt and should never fail. For this reason the best plan will be to follow Pfeiffer's directions for the time being. Most bacteriologists agree in this, that although the first culture may succeed with blood-agar, this medium is necessary for the further culture. Upon it the bacilli grow most luxuriantly and can be propagated ad libitum. Only care must be taken to tranfer them to fresh media after from four to five days, as they reach their acme of development after forty-eight hours and then rapidly die. Their cultivation properties are not destroyed after heating the blood-agar tubes for half an hour. It can be shown, using a medium containing haemoglobin, that the bacilli still cultivate in the depth of the puncture where the access of air is limited, although

they do so far more scantily than with perfect access of air. They cannot be cultivated at all when oxygen is entirely excluded. It is difficult to prove infection through atmospheric dust, as the bacilli perish under prolonged exposure to daylight, and the temperature of an ordinary room speedily destroys them.

PATHOGENICITY.

Experiments upon Animals.

Human influenza is an affection that is peculiar to mankind, and does not exist in domestic animals. Nevertheless, in spite of this general aphorism, there have been made numerous experiments with the object of inoculating animals with the disease. Monkeys were said by Pfeiffer to be susceptible, but only signal failure was observed in the case of mice, rats, guinea-pigs, dogs, cats, rabbits, and swine. He made the interesting experiment of injecting into the trachea of a monkey a small flake of influenza sputum, the size of a pin's head, which the microscope had shown to contain a pure culture of the bacillus, the flake having been well divided in 1 c.c. of bouillon. The animal died after having presented but slight symptoms, and at the autopsy a walnut-sized abscess was found adjoining the trachea at the point of injection; besides, some portions of the lung were atalectic and the afferent bronchi were filled with a greenish-yellow pus. The pus of the abscess as well as that of the bronchi remained sterile when spread upon agar. The microscopical examination revealed in the pus only very few influenza bacilli which stained poorly, but no other germs. Three other monkeys were inoculated with dilutions of these bacilli which had been cultivated for twenty-four hours upon blood-agar; the injections were made directly into the lungs through the walls of the thorax. The reaction of the animals consisted in fever which began in from twenty to thirty hours after the inoculation, had a remittent character, and ended in lysis; the evening temperatures became progressively lower from day to day. The animals also had a cough, but recovered, and when they were reinoculated after two weeks they reacted much more mildly. Another monkey received some of the culture into the nose, any injury of the mucosa being avoided; the same evening fever set in and continued for several days. A fifth monkey received into the trachea an injection of three entire influenza cultures diluted with 1 c.c. of bouillon. The same evening the temperature rose rapidly to 39.2. C. The next day the monkey was very sick, the temperature began to fall, and death occurred forty-eight hours after the injection, with symptoms of profound prostration and a temperature of 32.2. C. The fact of the lethal issue being due to the toxaemia induced by the influenza bacilli, the nonemultiplication of the injected organisms, and the fact of corresponding anatomical changes not occurring, must give to this experiment a great importance. The same authority performed further experiments in order to ascertain the toxicity of his bacillus, and he found that rabbits were very sensitive to the poison of this disease. After an intravenous injection of a twenty-four hours' culture of the bacilli upon blood-agar diluted

with 1 c.c. of bouillon, he invariably observed the characteristic clinical phenomena described. The animals, which were quite lively after the injection, presented the first symptoms of poisoning after from one and a half to two hours. A marked dyspnoea set in, together with very notable muscular weakness. The rabbits, breathing with difficulty, lay on the ground with loosely extended extremities. Still, there were no symptoms of actual paralysis, for when the animals were lifted up they moved their legs in an apparently normal manner. The body temperature showed a marked febrile reaction, the temperature rising to 41. C. After five or six hours the animals gradually became more lively, resumed their normal position, and began to move like healthy rabbits. The past attack of toxaemia was after twenty-four hours indicated merely by only a slight febrile rise. The animals died with somewhat similar symptoms, more marked, when twice or three times the dose was administered. Before death the temperature fell to less than 36. C. The autopsy gave no very definite results. There was some hyperaemia of the lungs, the spleen was small, but there was nothing else important. It is a noteworthy fact that histological and bacteriological examination of the blood and of the various organs showed only a quite exceptional growth of the influenza bacilli; consequently there was no multiplication of the injected germs, but rather their speedy death in the body of this animal. Intravenous injection of like doses of cultures killed by chloroform likewise gave rise to similar toxaemic symptoms in rabbits. Hence the influenza cultures contain a virulent poison that produces in these animals dyspnoea and muscular weakness resembling paralysis, i.e., symptoms akin to those of the human affection. Relatively much larger doses of the bacilli are required to affect mice and guinea-pigs. No less than eighteen experiments were made by Nastinkov upon laboratory animals. Pure cultures grown according to his method upon yolk-peptone-agar were used for the injections which were made into the trachea, the lungs, the auricular vein, and the peritoneum. In one experiment the valves of the heart were injured mechanically by a sound introduced through the common carotid artery to the floor of the left ventricle. Of the animals 12 were rabbits and 2 guinea-pigs. In order to reduce the resisting power of the animals, ether or alcohol was injected into the trachea or into the lungs. For one of the experiments a rabbit was used which had been infected with tuberculosis. In all of the cases in which pure cultures were injected the animals showed some reaction. Healthy and robust animals bore the injections better than the weak and sick. The lymphatic glands showed hyperplasia and caseous degeneration; they, with the lungs and liver, were most seriously affected. The lungs presented signs of inflammation and the liver was enlarged. A very large number of interesting experiments were also instituted by Kruse who, like Pfeiffer, found that while it was possible to kill the animals ordinarily used for experiments by means of large doses of the bacilli, yet these would not develop in them. Rabbits are most susceptible; with them a reaction may be obtained with comparatively

small doses, e.g., one-fifth of an agar colony. When these animals are inoculated subcutaneously a local swelling results, and in from one to 2 weeks this becomes a consistent nodule which on section resembles a potato. After a further lapse of time the nodule softens, and ultimately we find thick pus like that common in rabbits. The smaller nodules are absorbed, the larger ulcerate. The influenza bacilli can usually be demonstrated under the microscope only during the first few days, but they are evidently degenerated; sometimes, however, a culture will succeed even after the lapse of weeks. This local affection in rabbits seems to our author to be quite characteristic of influenza bacilli, as he has not met with it under other conditions. Microscopical examination shows that we have to deal with intense purulent infiltration of the subcutaneous tissue which, contrary to what occurs in ordinary suppuration, is followed by liquefaction of the tissue very late and sometimes not at all. No analogy can be established with the tissue alteration produced by the grippal affection in the lungs. It is essential that we assume that the influenza bacilli produce a toxin, or several toxins, which exert an influence preëminently upon the central nervous system, in order to explain the effect of local infection of the respiratory organs upon the system at large. Of course, in the case of some affections, the presence of the bacilli as such in other organs than the lungs will be effective. Thus, Přibram calls attention to some grave cerebral symptoms for which he blames the immigration of influenza bacilli into the meninges. Pfuhl's researches likewise point to the demonstration of the bacilli in the brain, in blood preparations, and in the fluid of the ventricles during encephalitis and meningitis. The cases reported in connection with the nervous symptoms of influenza prove the multiplicity of these manifestations, leading as they do to intense, prolonged morbid features in central and peripheral portions of the nervous system. The influenza toxin evidently acts preëminently upon the brain; for this reason Cantani investigated especially the influence of the bacilli upon this organ. He first convinced himself that trephining did not injure the animals, and therefore ascribed the results of his experiments to bacterial action alone. He succeeded in killing rabbits by the injection of relatively small doses of living influenza bacilli. The first symptoms produced was a rise of temperature to 42. C. Along with this was observed a steadily increasing dyspnoea; paralysis also set in, beginning with the hind legs and spreading forwards over the whole body. The animals lay helpless on one side, unable to raise either head or ears. This condition continued for hours, and finally the animals died. When a non-lethal dose was used the symptoms were less pronounced, and then a chronic meningitis frequently developed; this was sometimes fatal, but often ended in recovery. The minimal fatal dose varied. With moderately virulent cultures the animals died from 0.5 mgm. of a twenty-four hours' blood-agar culture. When very virulent, however, very small quantities sufficed; thus, the animals

were killed in twenty-four hours by means of loops of the culture diluted with 1 c.c. of bouillon. All the usual evidences of a profound toxaemia were noted at the autopsy. A sanguineous exudate was often present in the abdominal cavity, and there were hyperaemia of the peritoneum, spleen, liver, kidneys, and lungs, as well as nephritis and pericarditis. Our author, however, was never able to demonstrate influenza bacilli in the peritoneal exudate, in the blood, or in the organs. The bacilli were present, on the other hand, in the gelatinous oedema at the place of trephining, in the fluid of the ventricles, in the cerebral substance where they had enduced an acute encephalitis, -so that the bacilli seem undoubtedly to have multiplied in the brain. They appeared to spread by preference through the lymphatic vessels. The influenza bacilli were also demonstrated in the spinal cord. They seemed to immigrate into the gray substance through the central canal. A considerable increase in virulence could be induced by the admixture of brain emulsion. Consequently the cerebral tissue forms a very suitable medium for the development of these germs. He injected dead bacteria into the brain for the purpose of ascertaining the degree of toxicity. When the animals were injected subdurally with lethal quantities of the toxin, the temperature rose, often to 42. C., in from ten to twelve hours; then it fell until death ensued. Meningeal hyperaemia and cerebral haemorrhages accompanied these intoxications. When the dose was not fatal, the febrile condition continued for about two days, and then the temperature returned to normal. Paralytic symptoms were particularly prominent. Sometimes the animals recovered even after complete paralysis, and at the same time great emaciation was observed. There was no acquired immunity, as with every repetition of the intoxication the receptivity of the animal to the poison very markedly increased.

SPECIFICITY.

The regular and invariable occurrence of Pfeiffer's organism in true influenza is one of the most important facts in favour of the specificity of that bacillus; its not being found by certain observers is probably partly due to defective bacteriological methods and their inability to secure a response to tinctorial reactions. Another very capital fact from the standpoint of specificity is the absence of the bacillus influenza in all other affections of mankind. No great importance can be attached to the fact that it had not been found before Pfeiffer's time in other diseases of the respiratory tract, as at that time but few individuals had seen it even in influenza. But since his great discovery the most reliable observers have confirmed the statement that the bacillus in question is not to be found in simple bronchitis, in suppurative affections of the air passages, or in tuberculosis uncomplicated with influenza. In some circumstance the histological observation of the influenza bacilli proves the existence of the disease. One is pretty safe, for instance, in so affirming when they are detected in

a preparation of sputum; and it is also allowable to speak of a typical influenza sputum, there being likewise many cases in which the clinical manifestations correspond to true influenza and the bacilli are found in the expectoration of the patient in pure culture. In the sputum the bacilli often have a characteristic arrangement, lying together in long trains, so that they have been compared to schools of fish, and often they are present in such enormous masses that they cover the entire field of the microscope. It is most desirable, however, to establish the identity of the bacilli by culture, if every doubt is to be excluded, for this method leads to the certain demonstration of the influenza bacilli, often more rapidly than the histological examination. The culture succeeds only at the higher temperatures, either by taking the material containing the bacilli, such as the sputum or the pus from cavities, and spreading it directly over the surface of the ordinary media, or when the original material has been diluted, by using thesurface of media which have been covered with blood or haemoglobin. Kruse's method, which is very reliable, is to take several tubes containing 2% nutrient agar, pouring off the water of condensation accumulated at the bottom, liquefying the agar, and pouring it into Petri dishes. By not closing the latter, but allowing them to cool under a bell glass, greater evaporation is obtained, and the sunsequent occurrence of water of condensation is prevented. The pigeon blood is then spread by means of a previously heated platinum brush over the surface, and in the same manner the material to be tested for influenza is applied either directly or after dilution with sterile bouillon. Some material is then taken from the finished plate with a previously heated brush and spread over a second plate coated with blood, and so on. In this way any desired dilution is obtained. This method has material advantages over that employed by Pfeiffer, who spreads the material over obliquely congealed agar surfaces. Among many hundreds of foreign colonies it is easy, according to Kruse's method, to find even a single influenza colony and to isolate it, especially as the latter is extremely characteristic. Such colonies usually appear perfectly transparent, colourless, and structureless; only under certain conditions they have a yellowish tinge in the centre, that is, when the layer of blood corpuscles is rather thick on the plate and theage of the culture is somewhat advanced. Of great importance, moreover, is the lustre due to the curvature of the colony, whose contour may be regular or irregular. While a confluence of the several colonies with each other or with foreign colonies is possible, the line of separation can always be made out under the microscope. When these several peculiarities are borne in mind, influenza colonies will hardly be confounded with others. The diagnosis becomes sometimes more difficult with the naked eye, although it can, as a rule, be made even when the plates are plentifully covered. The perfectly transparent, dewdrop appearance is occasionally found with other species of bacterial colonies, e.g., diplococci, and, on the other hand, the influenza colonies

are not always absolutely transparent and colourless, as I have stated above. In the many cases in which the microscope fails this method of cultivation proves sufficient for the diagnosis. Histological failure occurs either when the bacilli are too sparse, perhaps partly degenerated, and enclosed in cells, or when numerous other, morphologically similar bacteria are present, as in the secretion from the mouth and the neighbouring cavities. Thus Kruse, for instance, succeeded in a case of phthisis, in isolating the bacilli three months after the onset of an attack of influenza, although it had been impossible for several weeks to demonstrate them under the microscope. When we faithfully observe the directions of the discoverer of the specific bacillus the further cultivation of his organism from the plates is easy enough. In the late generations the addition of blood to the agar is always necessary to secure development of the colonies. The transfer is best made at intervals of four days; after six days Kruse often encountered failures, although at times a positive result could be secured even after twelve days. He did not use other media, as he found pigeon's blood quite sufficient for his purpose. As it is not infrequently very difficult to recognise the influenza bacilli, owing to their differences in size and their tinctorial reactions, it is very necessary to resort to cultivation, as has been emphasised by Borgardt who points out that they may easily be mistaken for diplococci when their ends are more deeply coloured than the middle. In his culture experiments he found that well-isolated colonies formed on the plates in twenty-four hours when a properly selected flake of sputum was diluted with sterile bouillon and then applied. More luxuriant, though more contaminated with other micro-organisms, was the growth of the bacilli when, however, a flake was used directly for inoculation, the said development occurring within the shorter period of twelve to fifteen hours.

ASSOCIATION WITH OTHER BACTERIA.

It is important to note that the influenza bacilli may be observed in conjunction with other micro-organisms which may or may not have a special significance. In no less than 24 out of 30 cases Grossberger, for instance, found other germs developed more or less numerously alongside of the influenza bacilli. The admixture found consisted mainly of diplococci, streptococci, and staphylococci. In pure cultures only those isolated colonies attained the dimensions given by Pfeiffer, and besides they manifested a certain sensitiveness to excessive or deficient alkalinity of the nutrient medium. In mixed cultures with staphylococci they attained very uncommon dimensions, however, and proved extremely tolerant of marked differences in alkalinity. A careful investigations convinced him that in the symbiosis observed by him there was some influence exerted by the bacterial products upon the haemoglobin which effected such change in it - whether it was due to an altered solubility or a chemical change ina more restricted sense - as to make it more readily assimilable by the influenza bacilli. If this be true, an artificial mixed

culture with staphylococci would be apt to give rise to a tremendous development of the influenza bacilli, and in consequence thereof it would become very much easier to make them out. The blood and the urine have both been subjected to experiment at the hands of Teissier, Roux, and Pittion in order to discover bacteria in this disease. In a few cases their results were positive; they found in three instances in the urine and in two in the blood bacteria which are especially stated to have been polymorphous. This polymorphism consisted in the occurrence of diplobacilli and of long chains of streptobacilli. In bouillon cultures the bacillus was said to appear lancet shaped, resembling the microbe of pneumonia. Upon agar media it was said to resemble the bacillus of typhoid fever, while upon gelatine the culture was more like that of the bacillus coli. Still, I am inclined to think that this was not a pure culture and that different organisms were under observation. When theseinvestigators mention that the microbes in question were pathogenic for rabbits; that they produced convulsions, nervous attacks, vertigo, digestive disturbances, affections of the lungs or of the pericardium, and nephritis; but that the temperature curve presented a certain resemblance to that of human influenza, - it is not possible to form any definite conclusion as to what variety of micro-organism they encountered. Canestrini says that he found in the blood of a case of influenza a germ very similar to the bacillus influenzae. The resemblance to the latter in its morphological features, its mode of development, and its tinctorial reactions was marked, but it flourished well also in anaërobic cultures. This last peculiarity justifies the assumption that the bacillus was not that of influenza. Pfeiffer and Beck believe also that neither the organism described by Bruschettini, not that of Babes, was the one producing grippe. The same authors also reject the statements of Chantemesse, who in conjunction with Corneille injected into the auricular vein of a rabbit a drop of blood from an influenza patient, and subsequently found in the blood of the animal a bacillus which they thought was that of Pfeiffer. The latter stands quite apart from all other simulating organisms. Numerous observers have dwelt upon the finding of, not new varieties of microbes, but such as were previously known - the same being used to explain in various ways the manifestations of the disease. Here, of course, the question was strictly one of mixed infections, i.e., the association of Pfeiffer's germ with others. One of the earliest in the field was Seifert, who stated that streptococci in large numbers were present in the sputum of influenza patients. It was reported from Vienna that in the cases there examined Fraenkel's pneumococcus was uniformly discovered. Jolles found in the secretions and in the urine of influenza subjects numerous micrococci resembling Friedländer's pneumococcus, but their capsules could not be stained. He thought them to be connected with similar organisms which he had found, in December, 1889, in the Vienna drinking-water and which were said to have disappeared during the decline of the epidemic. The findings

reported by Seifert and Müller, in 1883, from Würtzburg, in which streptococci in long chains were described, form a transition to the discoveries made in Bonn. Rippert found the streptococcus pyogenes abundantly in the bronchial mucus, in the infiltrated tissue of the inflamed lung, and in the sputum of 5 cases. Finkler found streptococci in all pneumonic foci of true grippal pneumonia, the material having been secured by aspiration from the living patients, by means of a Pravaz syringe. He found the same organism in the lung and the spleen at 6 autopsies; once he found staphylococci and once diplococci, but these differed from those of Fraenkel. In all these findings, therefore, the ordinary causative agents of pneumonia occupied a subordinate position. On the other hand, Weichselbaum discovered a coccus resembling the diplococcus pneumoniae in the secretions of febrile influenza patients. Marmorek found no microbes in the blood of influenza patients, but in the purulent bronchial secretion he discovered spherical and lancet-shaped bacteria, short bacilli with a gelatinous capsule, and diplococci. In one case Friedländer's pneumococcus was present. When the process was localised in the lung he found no other organisms than Fraenkel's pneumococcus. Diplococci were found, moreover, by by Georges and Burgas in the lungs of influenza patients suffering from pneumonia, and they obtained the same in pure culture from portions of the spleen. In the study of secondary morbid conditions during influenza Weichselbaum invariably found the diplococcus. Once a streptococcus was observed in the pus from purulent rhinitis, but the diplococcus appeared in all other conditions - in the urine, in the purulent discharges from the middle ear, in meningitis, in the intestinal canal of patients with enteritis, and in inflammatory conditions of the kidneys. Though these observers suspected some connection between influenza and the diplococcus, the other authors named above, who had found chiefly streptococci, were rather inclined to connect the latter organism with influenza, particularly because the frequent occurrence of the same microbe was also reported from distant localities. Thus, Laveran stated that he had but rarely met with the diplococcus in infectious pneumonia, but that streptococci were regularly present in the sputum. Bouchard also found the streptococcus among other bacteria in cases of influenza; and Babes, besides other bacteria which he described indetail, cultivated a streptococcus that was said to differ materially from the ordinary streptococcus pyogenes. In fatal cases of influenza, however, he had noticed, aside from these streptococci, other bacterial colonies which were connected with each other by peculiar radiating processes. While these earlier observers argued in favour of streptococci and diplococci, others reported observations in which the two species of bacteria were in many cases of the disease found either simultaneously or in succession. In 7 cases of inflammation of the middle ear following influenza, Levy found Fraenkel's diplococcus six times in pure culture and once the staphylococcus pyogenes albus; in one case of broncho-

pneumonia aspirated during life, Fraenkel's coccus. Levy maintained that, as these germs were found only in complicated cases of influenza, none of them could be the exciting cause, and that there was simply an infection upon a soil prepared by influenza. Both in the latter affection and in pneumonia, this author thinks that several microbes are responsible for the infection. In 7 cases Prudden examined the sputa and nasal secretion. In 2 of these the sputum contained preponderating masses of the streptococcus, besides other bacteria from the air; in the third case large numbers of Fraenkel's diplococcus and of the staphylococcus pyogenes aureus were present. In 7 cases of simple influenza no bacteria were discovered. The sputum of 6 cases of pneumonia following influenza contained diplococcus pneumoniae, staphylococcus aureus, and streptococcus pyogenes; 1 case, streptococcus and staphylococcus aureus. Kowalski, in the microscopical examination of dry cover-glass preparations from the secretions of the oral, nasal, and pharyngeal cavities, found no form of microorganisms specific for influenza, nor did he discover any species to be constantly present, only mixtures of bacteria were always demonstrated. By culture he isolated 30 different varieties of saprophytes, several familiar pathogenic germs, and 3 hitherto unknown organisms. He demonstrated staphylococcus aureus five times; staphylococcus pyogenes albus four times; Fraenkel's diplococcus pneumoniae twice; streptococcus once; Friedländer's bacillus pneumoniae, staphylococcus aureus, albus, and flavus, each once. Among the three unknown varieties which he demonstrated present, he found one, which he called the gelatine coccus, present seven times, and he says that he would feel justified inregarding it as the cause of this disease if it could be constantly found. The blood of influenza patients was carefully examined by Klebs, who found therein monads measuring 1 to 1.5 mm., which were in active motion, also a larger form, measuring 2 to 3 mm., that moved sluggishly. He observed these formations at the margin or in the interior of the red blood-corpuscles. In a later communication the same observer states that he had found in the subsequent cases, in the blood and in coagula, resting-forms which by transverse division produce types appearing as diplo- and tetracocci. He tells us that upon the ordinary firm nutrient media they seem to grow with difficulty, so that negative results are usually obtained; but when cultivated with blood they develop readily in bouillon and then resemble Fraenkel's pneumococcus, from which they differ, however, by their active motion. Inoculated upon dogs, they cause fever, though this is of short duration. Inasmuch as firm nutrient media must mean gelatine and agar plates, we note a certain resemblance to the second micro-organism, regarding which there have been proved defective growth upon gelatine plates when inoculated from the blood, as well as its pathogenic action upon dogs. Septicaemia in rabbits was produced by Leyden with the diplococcus of Fraenkel which he found in the sputum of influenzal croupous pneumonia. From one case with loose hepatisation of the lung he

was able to cultivate a variety of coccus which, inoculated upon rabbits, produced no effect. Different streptococci and staphylococci were discovered by him in another lung similarly affected. Drasche says that, in his bacteriological examinations of the complications of influenza, he found in the lungs streptococcus pyogenes, diplococcus Fraenkel, staphylococcus pyogenes aureus, albus, and flavus once each; in the pleural exudate, Friedländer's pneumonia bacillus once, and the pneumococcus Fraenkel and the streptococcus five times each. Kirschner, in the expectoration of his influenza cases, found without exception a micrococcus (diplococcus) with an oval capsule; it appeared never single but sometimes in chains. He found the same organism alone in pneumonia, in two cases of purulent pleurisy, and in the blood in three cases with severe general symptoms, but presenting no localisation in the respiratory organs. He believes that the micro-organism is not identical with the Fraenkel-Weichselbaum diplococcus, nor with the streptococcus pyogenes of erysipelatis. Experimental inoculations upon rabbits gave negative results. Our author leaves it an open question whether this diplococcus is characteristic of the disease and the causative agent thereof. The observation of streptococci, diplococci, and Friedländer's pneumobacilli is the most important of the various bacteriological experiences. In this connection it is to be specially noted that these different species of bacteria occurred by no means regularly in the disease at various places; on the contrary, in some localities an unquestionable predominance of one species was positively established. Dealing first of all with this relation to the streptococcus, Ribbert found in a large number of autopsical cases a streptococcus which he held identical with the ordinary streptococcus erysipelatis. In two cases the plates inoculated from a lung in a state of lobar disease had remained absolutely sterile. Along with these streptococci he found staphylococcus pyogenes aureus very sparsely, but never Fraenkel's diplococcus pneumoniae. He did not consider the diplococcus observed by him in one case in association with the streptococcus as identical with the pneumonic organism. A series of cases were specially investigated about this time by Finkler. In 45 cases of grippal pneumonia he examined the sputum, or material aspirated during life from pneumonic foci, or specimens from the cadaver. In every lung examined he discovered the streptococcus. In one single lung he found a staphylococcus, and a diplococcus which he held to be different from that of Fraenkel. So, too, in the examination of pus from two cases of otitis media the streptococcus appeared, in one case in pure culture, in the other associated with staphylococcus albus. In the sputum likewise the streptococcus was most frequently discovered. In the blood which he had obtained before death from the spleen, cultivation demonstrated streptococci and the absence of all other bacteria. In the blood of a cadaver dead of influenza the streptococcus was also found, although there had been no pneumonia. In this connection, however, it is to be particularly noted that

of 45 cases of pneumonia only 2 presented the type pf lobar fibrinous pneumonia, while the appearances of true influenza pneumonia were observed in the remaining 43 cases. Contemporaneously with this, Vincent obtained in Paris similar results, and Vaillard also. They examined intestines, blood, and exudates from influenza cadavers, as well as the sputa and pleuritic exudates from the living, and invariably found the streptococcus erysipelatis both on microscopical examination and by cultivation. Duponchel and Laveran found the same organism, but never the diplococcus pneumoniae. The latter Du Cazal also failed to discover in 4 cases of post-grippal pneumonia, though he isolated the streptococcus in 14. In spite of all this, there are, on the other hand, a large number of observations which showed the diplococcus pneumoniae along with the streptococcus. But it is noteworthy that among these there are very many cases in which either the diplococcus or the streptococci were present. In 10 cases of empyema investigated by Netter, the streptococcus was demonstrated seven times and the diplococcus pneumoniae three times. In only 2 cases both bacteria were present in mixed infections. Similar investigations are reported by Leyden, who found in the sputum of influenza cases in 4 instances only the diplococcus pneumoniae, in 3 only the the streptococcus, in 10 both diplococcus and staphylococcus. From some of the sputa cultures were made; they showed the diplococcus alone in three cases, the streptococcus alone in two cases, both bacteria mixed in two cases. Zaufal examined 2 cases of otitis media, one of which contained a pure culture of the streptococcus, as demonstrated by cultivation and the inoculation of mice, the other the diplococcus pneumoniae, likewise in pure culture. Schreiber examined 8 cases of otitis media during influenza, with the result that he found streptococcus twice, diplococcus twice, staphylococcus in pure culture twice, and an association of streptococcus and staphylococcus the same number of times. The examination of 7 cases of uncomplicated influenza was made by Prudden, who found in 2 the streptococcus pyogenes, and a mixed infection of the staphylococcus and diplococcus pneumoniae in a single instance. Buchner found in 3 carefully examined cases of influenzal exudates - 2 of pleurisy and 1 of pericarditis - the streptococcus twice and the diplococcus once, in pure culture. One of Emmerich's cases of empyema also showed the streptococcus. The sputa of 9 influenza cases were examined by Prior; in 2 of these the diplococcus alone was present, in the others it was associated with the staphylococcus and streptococcus. In the instances in which the three bacteria were conjoined, the diplococcus predominated in 4 cases; in the other 3 the staphylococcus was in the majority in 2, and in one the streptococcus ranked first. Among 20 additional examinations the diplococcus pneumoniae was present in 18. In 15 cases he found the three species of cocci conjoined, but in these also the diplococcus predominated. He also examined 16 cases of grippal pneumonia, and in them he invariably demonstrated the diplococcus pneumoniae; in 3 cases it was the only organism, in 7 it was associated

with streptococci, in 6 with streptococci and staphylococci. Aspiration of the spleen yielded in one case diplococci and streptococci, in another a pure culture of streptococci, in a third case streptococci alone. His examinations, however, showed a certain order in the way in which the different bacteria appeared. In 6 cases of influenza pneumonia carefully investigated by him, the mutual relation of the bacteria changed markedly and with rapidity. The staphylococci always remained scanty, but the streptococci increased enormously, so that in comparison with them the previously numerous diplococci dwindled, often so quickly that in from six to eight hours the appearance was completely altered in this sense. In 2 cases in which at first diplococci and streptococci were associated, the latter organism finally presented itself exclusively, a pure culture appearing at once upon the medium. This relation was observed by him so frequently as to lead him to draw special conclusions therefrom. This process becomes all the more important by the fact that in one case it could be demonstrated that, at the autopsy, this occurrence depended upon the stage of thedisease; for the recent foci in the lungs contained chiefly, and often exclusively, colonies of diplococci, the older and disintegrating ones were occupied by streptococci. Prior therefore maintains that the diplococcus is largely the forerunner of the streptococcus; that the former creates, or helps to create, conditions under which the latter flourishes best. Many cases differ at the outset in that the diplococcus predominates or is alone present in some, while in others the streptococcus assumes this position. When relapses occur, they are due to the diplococcus. When the disease takes on a grave character the streptococcus will always be found. It appears, moreover, from the aspiration of the various exudates that the streptococcus renders the prognosis worse; thus, in pericarditis it was alone present, in grave pleurisy it predominated and subsequently was the sole organism, in suppurative otitis it was proved by culture to be frequently alone present. In a patient who had succumbed on the first day of the disease Prior succeeded in finding in the spleen the diplococcus alone, while in patients dying after seven days' duration of the affection streptococci predominated in the spleen and were the only bacteria often alone present. All these fact point to the possibility that the streptococcus follows in the train of the diplococcus, crowds it out, and after its death possesses the ability to proliferate alone and to keep up independently the inflammatory process. Furthermore, the diplococcus pneumoniae has been discovered either alone or in excess in influenza lesions. Thus, Levy found in the sputum of grippal patients masses of Fraenkel's diplococcus pneumoniae, sometimes along with staphylococci and streptococci; among 7 cases of purulent otitis media he found it in the secretion in pure culture in 6, in the seventh case it was associated with the staphylococcus pyogenes albus. In the examination of 5 cases of empyema, of serous pleuritic exudates, and of one seropurulent exudate, he discovered the diplococcus pneumoniae eight times, only once conjoined with the staphylo-

coccus, and the latter alone but once, i.e., in serous exudate. The diplococcus was also seen by him in a case of bronchopneumonia. Weichselbaum made special examinations of the sputum of 21 cases, including one with bronchopneumonia and 2 in which fibrinous pneumonia developed subsequently; the rest were uncomplicated. He studied the case not only under the microscope, but also by culture and by animal experimentation. The sputa were always remarkably rich in bacteria; as a rule, one species of coccus predominated and at times were exclusively present. The similarlity of these findings to those of Prior is obvious. Weichselbaum says that this occurrence was observed only in fibrinous pneumonia, but not in the ordinary catarrhs of the respiratory organs. The diplococci found by him agreed culturally with those of Fraenkel, but showed marked differencesin animal experiments. When mice and rabbits were inoculated with pure cultures, only a third of the animals showed the effects that are usually observed after the inoculation of the first generations of the pneumococcus. Weichselbaum found only small numbers of streptococci and staphylococci. In the case of a young man with acute influenza he succeeded in demonstrating the same diplococci in the urine. The same organisms were particularly abundant in material taken from cadavers. The examination covered the bodies of 10 persons who had succombed partly with, partly without complications. In every instance the accessory cavities of the nose, the maxillary and frontal sinuses were completely filled with thin or lumpy pus, invariably containing diplococci which, inoculated upon animals, always proved extremely virulent. In no instance, therefore, was the diplococcus not found. In the sputum the latter organism, along with others, was found in the sputum by Sirena. Marmorek cultivated the diplococcus constantly and pre-eminently in 7 uncomplicated cases of influenza. The organism found by him flourished more luxuriantly in the culture, but was faf less virulent in animal experiments than is usual with the pneumococcus. Germain See and Bordas demonstrated the diplococcus pneumoniae almost regularly in the secretions of the patients and in the pneumonic exudates of the cadaver. Bouchard found the diplococcus in grippal pneumonia, staphylococci in the vesicles of labial herpes accompanying influenza, and streptococci in the bronchial secretion. Haegler demonstrated the diplococcus by cultivation in 10 out of 12 cases of influenza, in the secretion of the nose and pharynx, in the sputum of pneumonia patients, and in empyema. Krannhals found the diplococcus often associated with streptococci, in each of 20 autopsies of cases of croupous pneumonia and pleurisy following influenza. Post-grippal purulent bronchorrhoea revealed to Curschmann the presence of the staphylococcus in every instance. Friedrich says that he isolated the staphylococcus albus in an uncomplicated case, once during beginning inflammatory manifestations, and a staphylococcus resembling the former, which was pathogenic to mice. A streptococcus was found twice, and the diplococcus pneumoniae twice. The streptococcus, when

cultivated, showed differences from that of erysipelas. Its development was more luxuriant, the growth was more pronounced in the depth than at the surface, and the temperature most conducive to it lay between 37. and 40. C. It was also distinguished from the erysipelas germ by its slight virulence and power of resistance. It is reported by Deligiannis that he conducted examination of 8 cases of influenza, and, for the purpose of control, 2 cases of true pneumonia. Aside from the bacterium termo and the staphylococcus pyogenes aureus, he attached special importance to the discovery of an hourglass bacterium. He applied this term to a bacterium in clusters composed of paired cocci connected in hourglass shape. He based his differentiation of these bacteria from diplococci upon their hourglass shape, their distribution in clusters, and a peculiar tinctorial reaction. Babes frequently found a pathogenic streptococcus which differs in several respects from the ordinary streptococcus. In one case he discovered a micro-organism which resembled the lancet-shaped sputum bacterium. He also found, besides the staphylococcus pyogenes aureus, some zoögloea forms and diplobacteria, and two species which proved pathogenic to mice and rabbits. Petruschky discovered in some cultures made from the blood of influenza patients streptococci differing from each other by their development and reaction. In a case of cerebral abscess during influenza he obtained by plate cultures an acid-forming streptococcus. His cocci histologically proved to be arranged in pairs and in straight short rows, and they responded to Gram's stain. A delicate micro-organism, occurring isolated or in pairs in small groups surrounded by a frothy mass, was discovered by Arloing in a bouillon culture from the blood of an influenza patient; it was pathogenic to rabbits and differed from all known bacteria. Further researches of Kirchner were the examinations partly of the nasal secretion and the sputum, partly the sputum and the blood, and partly the pleuritic exudate of 29 cases of influenza. Every sputum without exception contained a micrococcus, which was extremely small, was surrounded by an oval capsule, and was double, never single, and while it exceptionally appeared in chains it did not lose its character of a diplococcus. The same pneumonic organism was found in the pneumonia cases, unaccompanied by other microbes; also in the pleuritic exudate which was purulent in two instances. In 3 cases of grave general infection without marked localisation in the respiratory apparatus he was able to demonstrate these organisms also in the blood. The diplococcus found by him was not identical with Fraenkel's pneumococcus, nor with streptococcus pyogenes, nor with streptococcus erysipelatis. He did not endeavour to determine whether or not this diplococcus was the causative agent of influenza or characteristic of that affection. From the blood of a woman suffering with influenza Fischel isolated two species of micro-organisms, which he declared to be diplococci of a form hitherto unknown, and which differed from each other in their growth upon different media and their effect upon animals. His

experiments showed that one of these cocci cultivated by him was not pathogenic for rabbits, dogs, horses, and fowls, while the other species was pathogenic for dogs and horses. He thought the symptoms produced in these animals were similar to, if not identical with, those of the distemper to which they are subject. In old sterilised bouillon cultures of this last variety of coccus, Friedländer's pneumobacillus and the streptococcus pyogenes flourish more luxuriantly than in fresh broth made from meat. Finally we may note that none of these observations have lost their value through the discovery of the specific bacillus of influenza; for the clinical picture of that affection has considerable multiformity and the bacteriological findings furnish many points in explanation of this fact, few epidemics probably reproducing the same conditions.

HAEMATOLOGICAL PHENOMENA.

It is not a common thing to come across the bacillus influenzae in the blood of the patient; indeed, the discoverer of that organism was able to make out his microbe only in those tissues & blood-vessels as had large numbers of bacilli around and within. All the experiments made by him with a view of obtaining the bacilli from the blood were negative in their outcome. Therefore, he came to the conclusion that, as a rule, the influenzae bacilli do not circulate in the blood during the grippal seizure. After spreading the blood upon the surface of the medium the conditions would appear very favourable for obtaining a luxuriant growth of any contained bacilli, as these organisms develop with the greatest facility upon blood-agar. Kruse, Pansini, and Pasquale conjointly, during the Neapolitan influenza epidemic of 1890, made extensive investigations into the bacteriological condition of the blood. At that time the view prevailed that the presence of the bacilli in the blood was a matter of importance, especially in cases in which the symptoms pointed particularly to the nervous system or to other organs. They examined the blood in 50 cases of influenza, from the earliest stage onwards. With all due precautions they collected from the patients from 3 to 15 drops of blood upon liquefied gelatine, mixed it with agar, poured it upon Petri dishes, and kept it at a temperature of from 36. to 37. C. Even after keeping the dishes in the oven for ten days, the results were quite negative. In addition to this improbability of the bacilli being transported in the blood stream, we have the fact that the microbes were found only in exceptional instances in other organs. Pfeiffer succeeded a few times in cultivating isolated colonies from the spleen and kidneys obtained at autopsies. The brain is said by Pfuhl to have contained the bacillus influenzae in one of his cases, and others have reported its observation in the spleen at autopsies. In the year 1892 Canon published the results obtained by him in the examination of 20 influenza patients. In nearly all cases he found one and the same micro-organism in the blood. He stained these in cover-glass preparations by allowing the blood film to dry in the air and then exposing it for five minutes to the effect of absolute

alcohol. The stain consisted of a concentrated watery solution of methyline blue and a solution of eosin. According to the narrative, the organism, coloured blue, is found sometimes in large numbers, but, as a rule, only sparsely and after prolonged search. It may appear as a small diplococcus, or else, when more deeply stained, as a short bacillus. In 6 cases he found this organism in groups of from five to fifty individuals. In these 6 cases the blood was taken during a fall in temperature. In most instances the preparation of the specimen was conjoined with inoculation of the blood upon agar and bouillon. The cultures were repeatedly injected into mice, with negative results. He asserted that this micro-organism occurred in all influenza patients, and since it was not found in blood from other sources and was a bacillus thus far practically unknown, he thought it stood in direct relation to influenza. He also says that Koch examined his preparations and considered them identical with the bacillus influenzae. Later he came to the conclusion that these cultures were not of the latter organism, but in 6 subsequent cases he cultivated from the blood a bacillus which he asserted to have been the bacillus influenzae. An extremely laborious examination of the blood was required in order to find the bacillus in it. Whether this was really the bacillus influenzae or not must remain an open question. The small bacilli found by him in the centrifugalised urinary sediment have also not been positively identified as influenza bacilli. On the strength of these rather inconclusive investigations, he believes that he had not to deal with an accidental admixture with the blood of isolated bacilli from the respiratory passages, but with a true propagation in the blood. He explains the clinical forms manifested by influenza in the following way: The influenza bacilli reach the air passages, where they find a favourable nidus - the catarrhal form of the disease; the bacilli develop but sparsely in the air passages, but profusely in the blood - the nervous form; and they may develop luxuriantly in both of these locations - the grave form with pronounced constitutional and catarrhal phenomena. Pfeiffer himself says that Canon's idea is erroneous, for he proved by actual investigation that most cultures started by the latter from the blood remained sterile, while four later cultures did not contain any influenza organisms, but only other germs. Canon's microscopical blood preparations, however, contained small bacilli which resembled the influenza specific germ. Bruschettini also has raised difficulties in the question of the influenza bacillus. He began by taking the blood from the brachial vein of influenza patients, especially those who were in the acute febrile stage. Then he allowed the bacteria to develop in the same blood at the temperature of 37. C., and in this way he discovered a bacillus which is devoid of spontaneous motion and grows well upon ordinary media, but much better upon human and rabbit's blood, or upon blood serum mixed with gelatine. It grows also, though more sparsely, in gelatine at 22. C. The bacillus is anaërobic. It stains only faintly with simple aniline solutions, but does so fairly well with

Loeffler's solution and with dilute Ziehl's solution. It does not react to Gram's method. It is polymorphous and, according to the stage of its development and the nutrient medium employed, it may present itself as a diplococcus, a streptococcus, or a bacillus. In glycerine-agar it appears as a coccus, in rabbit's blood as a small bacillus with rounded ends, two or more individuals being united in chains. It is natural to suspect that these were not pure cultures. The discoverer of this bacillus also investigated its pathogenic qualities and reported the remarkable fact that he always found agar and bouillon cultures without effect, while blood cultures were harmless to guinea-pigs and rabbits, but proved pathogenic to dogs and white mice. He found the morbid picture produced in the rabbit after injection of the culture into the trachea to be very similar to that of influenza in man. There result fever, mucous catarrh of the nose, dyspnoea, and death after from twelve to fifteen days, with symptoms of bronchitis and pneumonia. The inoculated micro-organisms were found in large numbers in the blood and bronchial secretion of these animals. These bacteri also had a poisonous effect when acting through the blood. An injection into the veins caused death; one into the pleura, into the pericardium, and into the peritoneum of rabbits produced acute inflammation of these serous membranes and often even death of the animal. The bacillus which he discovered was especially tested by Bombicci, with a view of discovering whether it can stand desiccation, and whether, if introduced into the respiratory organs, it is able to cause influenza in animals. He says that he infected animals by making them inhale the dried masses of bacilli. The bacillus resisted rapidly drying for about a month, slow drying for seventy days. It has, however, been shown by others that he must have experimented mainly with streptococci, whose virulence was mitigated, and that he made many mistakes in his technique. The assumption that in the nervous form of the disease we would be most likely to find the causative agent in the morbid products and in the blood, is made by Kruse, Pansini, and Pasquale. In 50 specimens of blood examined in various phases of the affection they were unable to demonstrate the presence of microscopic micro-organisms. From the sputum they were able to cultivate, besides the streptococcus and Fraenkel-Weichselbaum's coccus, several other bacteria, especially a number of cocci which did not prove pathogenic to dogs and horses, but which from their morphological appearances were regarded as varieties of the coccus just mentioned. Finally, it may be noted that Kitasato and Babes have described bacilli more or less similar to that specific of influenza, but the essential and fundamental difference consists in the fact that they were able to cultivate their bacilli upon gelatine and ordinary media, and this not only in the first generation, which is possible also with the influenza bacillus, but to the tenth and later generations. Knowing as we do the peculiarities of the influenza bacillus, we are forced to the conclusion that all these observers had to deal with other bacteria. They erred in the

same way as all experimenters did during the first epidemic of the disease; and thus alone can we explain the fact that even skilled observers could not find a trace of the bacillus influenzae during that outbreak, while only some other organisms developed upon their media.

SPUTUM CHARACTERISTICS.

When the patient is attacked by influenza, and during the pyrexial manifestations, the influenza bacilli are found in the viscid, frothy sputum expectorated from the bronchi during the violent attacks of coughing; they appear in free swarms imbedded in the mucous ground substance of the sputum, while the pus cells contain the specific germs only in small numbers. With the advance of the affection the histological appearances of the sputum change ina characteristic manner. The number of free influenza bacilli decreases, while the puscells are actually packed with the delicate germs in question. The great majority of the bacilli are in the interior of the pus cells subsequent to the acute stage of the influenza catarrh and during the convalescence of the patient. The bacteria also present distinct signs of degeneration: they become very slender, disintegrate, give a poor tinctorial reaction, and refuse to cultivate. The explanation of this fact, in the case of some convalescents from the disease whose recovery is unusually protracted, is to be found in the persistence of the bacilli for weeks after the grippal seizure; and, especially in the morning, they can be demonstrated in abundance in some of the sputum fragments raised. Althoughthe discoverer of the specific bacillus had no difficulty in recognising their presence in the expectorated material, he utterly failed to demonstrate them in the blood. In numerous investigations of severe and slight cases of influenza, in which daily from 10 to 20 drops of blood were inoculated upon agar, every specimen remained sterile. Not a single influenza colony could ever be made to develop. This fact corresponds with the microscopical findings in sections of tissue. In two instances only did Pfeiffer see the influenza bacilli in the interior of the small veins. In both cases, however, these veins adjoined tissue that was completely filled with bacilli. As he succeeded several times in cultivating isolated influenza colonies from the substance of the spleen and kidneys, the possibility of their transportation by the blood stream cannot, however, be emphatically denied. Various observations covering a large number of special cases have since uniformly confirmed the presence of the bacilli in the secretions of the respiratory organs. As he stated in his first communication, he was able to find them in uncomplicated cases in absolutely pure culture and usually in enormous quantities. It is quite the usual thing to find various quantities of other bacteria in the sputum when influenza attacks persons whose bronchi are affected with some such other disease as phthisis pulmonalis. There is usually a mixture of of different bacteria, among which, however, the influenza bacillus predominates, in the secretion of the larynx and trachea. In cases of influenza pneumonia the foreign admixtures in

the bronchi become progressively sparser; in the smaller bronchioles and the pulmonary tissue the influenza bacillus alone remains. Inthe bronchi the bacilli lie in immense masses upon and between the destroyed epithelium, only here and there penetrating into the submucous tissue. At these points the pus cells are actually overwhelmed with influenza bacilli. This is particularly the case in the central portions of the inflammatory lobular foci. But they also penetrate the pulmonary tissue and get as far as the pleura. The false membranes presented their exclusive presence in two cases of post-grippal empyema examined by Pfeiffer. The latter's conclusions have been confirmed by Huber in two small epidemics occurring in 1893. In 5 sporadic cases, however, he was unable to demonstrate influenza bacilli either under the microscope or by culture. Still, in these recent cases he failed to examine the nasal secretion, and hence the possibility is by no means excluded that the true morbid process had its seat there. In the epidemic cases he found in the sputum, which was yellowish-green, viscid, and nummular, the bacilli present in enormous numbers and masses and almost in pure culture. He himself admits that in 8 other cases in which the process was quite recent and acute, the sputum, scanty and expectorated with difficulty, contained innumerable and various bacteria which possibly may have overshadowed the influenza bacillus. The latter, however, he found in 3 of these 5 cases when he examined the nasopharyngeal secretion. In 20 cases examined Nastinkov obtained a pure culture of the influenza organism, and Klein likewise demonstrated the bacillus in the bronchial expectoration in 43 cases of this disease. He also found them in the oral secretion, and noted their gradual disappearance as the patient convalesced. Beck, in cases of influenza pneumonia at the height of the disease, found the bacilli in pure culture in the sputum, very often enclosed in cells. He says that they persisted during convalescence and even after that, could be found for a long period in some cases, when at times they suddenly disappeared. The bacillus has, in numerous cases unsuspected during life, been discovered at the post-mortem examination. In 1892 Weichselbaum reported 6 autopsies on influenza cases. In all of these he could demonstrate the specific germ in sections of the bronchopneumonic foci. The bacilli were situated partly within, partly without the leucocytes and the alveolar epithelia. In the recent cases they were extremely numerous, in the older cases they were more scanty. He demonstrated the same bacilli also in 2 cases, the autopsy of which had been made some time previously, by staining portions of the bronchopneumonic foci which had been preserved in alcohol. He found pneumococci associated, but in pronounced lobular pneumonia theinfluenza bacillus was present in pure culture. His observations have since been confirmed by others. In 2 cases Kruse demonstrated the long persistence of the influenza bacilli in the sputum. In one patient he found the bacilli in the sputum for four months after the onset of the disease and ten weeks after the termination of the

epidemic, the number of specific bacteria being then, of course, much less than in recent cases. The bacilli, however, still retained their cultural and other characteristics. Bäumler, during the 1893-94 Freiburg epidemic of influenza, demonstrated the causative agent of this disease in the third case which occurred; and this was all the more remarkable as the patients were not at first suspected of suffering from influenza. He also demonstrated the bacillus in his hospital patients, and in some of them at as late a period in the convalescence as four weeks. In numerous other epidemic, interepidemic, and sporadic cases in various regions the bacteriological measures instituted have likewise revealed the presence of this microbe in the subjects of the disease.

PATHOLOGICAL ANATOMY

GENERAL CONSIDERATIONS.

Although I shall deal somewhat fully with the structural alterations encountered in influenza, it must be clearly understood that there are none absolutely characteristic of the disease. The bacilli are found in various situations, e.g., in the blood, the respiratory organs, and sputum. Few uncomplicated cases die, hence the opportunities for observation in such are comparatively rare; if death takes place from the severity of the toxaemia, there may be no gross changes indicating the cause of the lethal issue. Most cases, however, present lesions of the respiratory and digestive tracts. Complicated cases present the lesions of the complicating disease. Lobar pneumonia and bronchopneumonia are the most common. A secondary infective inflammatory process may be located in any organ or tissue. Let us consider first the system most often affected, i.e., the -

RESPIRATORY SYSTEM.

NOSE AND NEIGHBOURING CAVITIES.

Inflammatory processes may be herein observed. Babes described swelling and injection of the mucous membranes in these parts, together with a mucopurulent coating; and Weichselbaum found, exterior to the cavities, at one time thick oftentimes clotted and even thin pus, at another muco-pus, and less frequently only mucus within the cavities. According to the intensity of the process, the mucous membrane was only oedematous, diffusely injected, orshowed irregular ecchymoses. According to his observations, all the cavities were not, as a rule, affected. The frontal and superior maxillary cavities were most frequently involved, -and then only on one side, -whereas the ethmoidal cavities were diseased in but a small majority of cases. There was very frequently nothing abnormal noted in other parts of the mucous membrane. Epistaxis, in influenza an early and oftentimes variable symptom, is accompanied perhaps by a congestion with swelling of the Schneiderian membrane. Ballin reports an epidemic in a children's hospital, in which the influenza was marked by an infective nasal catarrh. The examination of the nasal secretions, in the case of 20 nurslings, revealed in 11 the diphtheria bacillus. In 2 cases inoculations demonstrated that the pseudo-diphtheria bacillus was concerned; furthermore, the absence of the bacillus was proved in the case of the father, mother, brothers, and sisters. Ballin describes, in a patient suffering from influenza, the occurrence of a frontal and ethmoidal sinusitis, with subsequent abscess of the brain. Rhinorrhoea and suppuration of the sinus have been reported by Cartaz. Roth has seen no less than 25 cases of inflammation of the accessory cavities of the face, the number being made up of 5 cases of frontal sinusitis and 20 of inflammation of the antrum of Highmore.

LARYNX, BRONCHI, AND TRACHEA.

In influenza cases we find more or less pronounced inflammatory lesions of the laryngeal mucous membrane. Cartaz has described oedema of the larynx; Réthi, an abscess of the epiglottis with ulcerations of the mucosa. This author tells of 2 cases of perichondritis which were complicated with paralysis of the laryngeal abductors. Ribbert reports several observations of a redness of varying intensity in the mucous membrane of the large bronchi, trachea, and larynx. This injection was least marked in one of his first observations, which was slightly different, however, in that there existed on the mucous membrane a white mucous froth, whereas, as a rule, it was covered with a tenacious, gray, or yellowish-green mucus. Babes already had laid stress upon these inflammatory appearances of the upper respiratory tract. He was also struck by the tenacious character of the mucus, which appeared now white, then grayish-yellow, and again entirely purulent. He further states that at the times the bronchi were filled with tenacious mucus of a brown character or with coagulated masses of pus; that the mucous membrane in these parts was markedly hyperaemic and of a brown colour. The injection of the mucous membrane will sometimes be found equally distributed over large areas so as to give one the impression of an erysipelatous process. The microscopical examinations would seem to bear this out. One of the first to specially investigate the point was Ribbert, who states that in his cases there existed a very marked cellular infiltration of the mucosa together with an engorgement of the blood vessels; this infiltration spread out between the glands up to the cartilages, and the epithelial cells were loosened to a great extent, the round cells being pressed between. It must be emphasised as an essential appearance that corresponding to this erysipelatous course the catarrhal changes in the mucous membranes show a strong tendency to advance, and they extend from the pharynx and nose to the larynx and trachea, and thence make their way into the bronchi and the substance of the lung; or the trachea and bronchi first appear infected, and the redness and swelling of the mucous membrane then extend to the nose and the neighbouring cavities and tissues. The tracheal and bronchial mucosa frequently present a more or less thick mucopurulent exudate, in which some one may discover the bacillus influenzae. Chantemesse says that the bronchitis may be foetid, and Peter insists on this attribute of the gripp-al bronchial inflammation. Nonat demonstrated, in 1837, at the autopsies of influenza pneumonias, the frequent occurrence of plastic formations and pseudo-membranes ramifying in the bronchi and hepatised lobes. In 3 autopsies Comby only found traces of bronchial inflammation, e.g., redness, swelling, and muco-pus, there being no signs of hepatisation. He also noted the presence of the pneumococcus in a state of pure culture in the sputum of the patients during life.

LUNGS.

The pathological pulmonary changes are so important as to merit detailed consideration, the more so as

many of the cases which come to autopsy are those who have died of pneumonia. The true influenza pneumonia is thus characterised: The inflammation occurs in scattered areas; from these centres the inflammation radiates in many directions, breaks through the lobes of the lungs, and constitutes small lobular pneumonias, which, though spread over a large area of lung tissue, still enclose small aërated patches. For this reason the cut surface of the lungs present a checkered appearance, inasmuch as the pneumonic areas are more deeply stained and in the later stages appear hyperaemic. The cut surface of the pneumonic areas themselves is absolutely smooth, sometimes granulated, as it were, never, however, granulated as is a typical fibrinous inflammation of the lungs. There is no hepatisation, but a sort of splenisation, in the areas which undergo infiltration. The forerunner of the inflammation itself is not at all, but only in part, of a fibrinous nature. The condition is one of a preponderance of cellular inflammation with an additional partaking of the interstitial tissue. The peculiar mixture of the inflamed with healthy lobular areas explains also the peculiarity of certain clinical physical symptoms. One is prompted to regard the affection as an erysipelas of the lungs, in view of the cellular character of the inflammation and the marked tendency to further spreading and development. Pfeiffer has also found the lungs of persons who have died of influenza the seat of pneumonic infiltration, but even to the naked eye essentially different from the uniform lobular hepatisation of croupous pneumonia. Without any difficulty he recognised that they are composed of a number of lobular areas which are either separated by aërated or, in part at least, merge into one another. In this manner originate the secondary apparently lobar infiltrations, which upon close examination, however, we can recognise as made up of the separate lobular pneumonic areas. He further describes the structure of the single lobular areas. In their centre small pinhead to pea-sized parts are separated by a grayish-yellow coloration from the surrounding dark-red tissue. Pressure upon the cut surface of the diseased lung shows exuding from the bronchi or from the centre of the infiltrated tissue a yellowish-green, thick, very tenacious pus, which at once reminds us of the sputum of an influenza patient. If we follow these events further, we recognise that we are dealing with the lesions of bronchopneumonia, extension of the inflammatory processes to the smaller bronchi, and thence into the parenchyma of the lung itself. Apart from clinical experience and the deductions which may be made therefrom, this view is based upon the account of the microscopical examinations which our author made of these lesions. He conducted his examinations over the entire bronchial tree, beginning at the larynx and extending to the alveoli, and by means of his superior tinctorial reactions rendered possible not only a recognition of the pathologico-anatomical changes, but also that of the bacteria present in influenza. He hardened his cut sections and embedded them in celloidin. The thinnest sections may be stained with Loeffler's

methylene blue, or, better still, with a diluted Ziehl's solution. In the latter the preparations must remain at least half an hour, and are then to be transferred to absolute alcohol which has been rendered slightly acid by the addition of acetic acid. Here the preparations require close watching. As soon as the original reddish-black colour changes to a peculiar violet-red the preparations are at once taken out and kept in xylol. Good preparations are distinctly stained and show a carmine tint. By this means the bacteria are intensely stained, and stand out very prominently, the cell protoplasm being stained a faint pink. In the course of our examination we find that the larger bronchial branches exhibit a partial destruction of their epithelium. Some epithelial fragments lie free in the lumen of the bronchus; in other places the epithelium is raised from its base by pus cells. We also see the latter collected together in small masses on the apparently intact epithelial edge, where they make for themselves a pathway between the cylindrical cells. They further fill all the cavities which are caused by the falling out of the ciliated epithelium in the epithelial bed, and cover in a much thinner layer the free surface of the same. The capillaries and vesicles in the neighbourhood of the bronchi he found to be engorged with blood, wandering cells studding the peribronchial connective tissue. A similar condition was observed in the smaller bronchi. Frequently, however, their lumen is filled entirely with a finely granular substance which must be regarded as coagulated mucin, which stains poorly and which encloses within itself numerous pus cells. Within the substance of the lung itself we observe small purulent infiltrations which are arranged in such a manner that in the diseased area the centre literally swarms with round cells. Here and there the structure of the lung is entirely gone, and in some places there form within such a changed tissue round and sharply defined defects, which same give rise, in sections to an appearance of a sieve-like character, when macroscopically examined. Very small abscesses he held responsible for this. The alveoli in the neighbourhood of these purulent pulmonary infiltrations contain, besides the round cells, swollen, pale, or often pigmented cells which he regards as lung epithelium. When these cells are suitably stained, we recognise that fibrin is entirely absent in the central infiltrated areas, and that in the outer zones it but scantily exists. Great importance can be attached to these appearances, because they indicate the typical differences between croupous pneumonia and influenza pneumonia; so much so that Pfeiffer says a confounding of these two processes is absolutely excluded by their means. He came to further conclusions by the examination of these parts of the lungs with higher powers. The small influenza bacilli described by him now appeared deeply stained and in enormous numbers in the bronchi, upon the epithelial cells as well as between them, being heaped up there and by the destruction of the epithelium being rendered more visible. Although seen but singly in the submucous tissue, we can make out these

bacilli lying in masses under the epithelium. Both the epithelial and the pus cells which lie between them are filled with the small bacilli. The significance of all this is that we have to deal with a catarrhal suppuration, as it were, which might be compared to the gonorrhoeal affections of the urethra and conjunctiva. The explanation of the picture is that the infectious agent irritates both the epithelial cells and the spaces between them, thus leading to hyperaemia of the submucous tissue. Numerous wandering cells now adhere to the walls of the vessels and reach the surface of the bronchus, there load themselves with the bacilli, and thus form the mucopurulent secretion of influenza bronchitis. There are fewer cells bearing bacilli in the outer zones of the pulmonary tissue, but the round cells which fill the latter are overloaded with these germs. Pfeiffer, dealing with the other microbes, especially strepto- and diplococci, says that he found nothing, even in recent cases, either in the sections or in smear preparations. In his explanation of influenza pneumonia, he starts with the idea that each infiltrated area stands in relation to a diseased bronchus, and that through the medium of the latter the cause of the disease is enabled to reach the substance of the lung. This description is especially based on changes which are found post-mortem when death takes place at the height of the disease. At this time the above-described changes very clearly show the morbid conditions of the lungs in influenza. If we examine the lung at a later period, after the inflammatory process has gone through later stages, then what strikes us most is the formation of abscesses, in consequence of which a few alveolar areas, which are entirely filled with round cells, merge into one another and form small, not infrequently miliary purulent areas. In other regions the infiltrated areas in the lung are transformed into cicatricial connective tissue. With the appearance of induration and carnification there appear in such places changes in the substance of the lung which lead to the formation of uniform, hard grayish-red, cartilaginous masses. These parts then project above the level of the pulmonary substance, and are seen on cross-section to be devoid of air. Then masses of newly formed connective tissue fill the alveoli. In this way also we have influenzal gangrene of the lung produced. The influenza infiltration is the primary condition, to which is added, in the case of gangrene, a secondary infection by means of inspired oral bacteria. These, finding a locus minoris resistentiae in the lung, thrive there. Pfeiffer is also inclined to the belief that the pneumonia of influenza may also proceed to caseation, as soon as the pneumonic infiltration has established itself in those regions of the lung which previously were the seat of tuberculous or so-called peribronchial nodules. In such lungs he describes, besides those places which have undergone total caseous degeneration and which contain numerous giant cells and tubercle bacilli, other regions which, on account of their uniform infiltration with round cells, remind us of the lesions of grippal pneumonia. But this process

of his has been shown not to be the only one(which is to be regarded as a genuine bronchopneumonia) that may exist in cases of influenza. Instances are also observed in which the mucous membrane of the larger bronchi and trachea shows characteristic changes, but in which the inflammatory appearances in the mucous membrane of the bronchi become less and less evident the deeper we enter into the bronchial branches. Here the link is wanting between pneumonic disease of a cellular character in the lung substance, on the one hand, and changes in the bronchi in the other. At any rate, we cannot accept the idea that in such cases the inflammation in the lumen of the bronchi spreads itself into the substance of the lung. There the finest bronchi are found in the centre of cellular inflammation, free from the appearances which he has described. Even without the instrumentality of a direct transmission of the bronchial pus by aspiration, there may occur infiltration of the lung, there thus being another connection between the diseases of the larger bronchi and the lung. Ménétrier reports the observation of a red and gray hepatisation with foci of purulent softening; in another case there existed a total gray hepatisation of the right lung with small miliary abscesses. Laveran has seen 5 cases of influenza pneumonia with suppurative pleurisy. Ménétrier says that he has oftentimes seen extrapulmonary localisations accompanying lobar pneumonia, e.g., pleurisy, pericarditis, fibrinous meningitis, and vegetative endocarditis. In a remarkable observation of Jaccound's the original lesion, which was suppuration of the lung superadded to gray hepatisation, became the starting-point for a general pyaemic infection, with vegetative endocarditis, miliary abscesses of the kidneys, purulent effusion into the right knee, and suppuration in the right arm. This infection was shown to be brought about by the streptococcus. Lancereaux describes several cases of pyaemia in the course of influenza complicated or not by pneumonia. The pathogenic micro-organisms were either the pneumococcus alone, or the streptococcus associated or not with the staphylococcus. Fraenkel tells of 5 cases of pulmonary gangrene consecutive to small abscesses formed in the centre of the lobules of the lung the seat of inflammatory processes; in the same at times the streptococcus and the bacillus influenzae existed. In one of Jürgensen's cases which came to autopsy from mortal pneumonia, there were observed a subdiaphragmatic abscess behind the spleen and the right lobe of the liver, and an abscess somewhat larger in size than the hand without peritoneal lesion. Garnier says that he has given special study to the reports of grippal pneumonia and tuberculous caseation; the pneumonic areas produced by the pneumococcus, the streptococcus, and the staphylococcus, were later on invaded by Koch's bacillus. Bernheim tells that, in his service at Nancy, a boy of six years, suffering from right pneumonia, in the midst of an influenza epidemic, showed Pfeiffer's organism in his sputum. In about twelve hours there occurred rapid hepatisation from the apex throughout the entire lung, and in his case there was seen to be a mixed infection

also with the pneumococcus and swarms of tubercle bacilli. The right lung at the autopsy showed the well-known characteristics of caseous pneumonia. The grippal pneumonia, originally fibrinous, had been transformed subsequently into caseous pneumonia, the influenza paving the way for the lodgment of the tuberculous germ. According to Jaccoud, the grippal fibrinous pneumonia presents, in general, some special characteristics, as much from the clinical standpoint as the anatomical; the areas of hepatisation are but only slightly extended, but multiple, and this affection, essentially mobile, progressively invades the different portions of the lung. This is the "pneumonia migrans" of Germain See.

PLEURA.

Affection of the pleura in influenza is by no means infrequently observed. In mild cases the pathological changes consist of fibrinous flakes, which are in part thin, in part thicker, either circumscribed or diffused. Often they may be torn off as membranes, but often the fibrinous masses have become soft and purulent. In cases of marked disease of the pleura, together with gangrenous changes in the lungs, Pfeiffer observed a purulent coating on the pleura, which upon microscopical examination was seen to contain an enormous number of influenza bacilli, these being gathered together for the most part within the pus cells. In another case of influenza in a phthisical subject, he found purulent exudation which covered the surface of the lung, swarms of bacilli being contained in it. Both Ribbert and Leichtenstern affirm that the pleural exudations in influenza have a characteristic appearance. The sero-purulent exudations are characterised by a thin, cloudy, peculiar dirty-yellow appearance of the fluid, which the former observer designates as clay-water-like and the latter as cream-of-tartar-like. Ribbert also states that very marked inflammation of the pleura may exist without a previous pneumonia, whether the bronchi at the same time are intact or the seat of inflammatory processes. There can be question that the observers at the time of the last influenza epidemic were dealing, in those lobar consolidations which involved one lobe or an entire lung, with fibrinous pneumonia which did not differ in any way from ordinary croupous pneumonia. On the other hand it has been asserted that in such cases certain differences exist. Thus, Ribbert found in numerous cases that the cut surface of the hepatised lung was practically smooth, not granular, the exudate soft, ~~rich~~ rich in cells, but poor in fibrin; and in one case, the single lobules not being uniformly altered, a lobular character could be recognised upon the cut surface of a lobar consolidation. It appears that in a series of 7 cases Weichselbaum found that the diseased lung was not absolutely aerated, and that there was no marked granulation on its cut surface. Morel-Lavallée describes the finding at autopsies of a subacute and diffuse pleurisy with affection of the celluar tissue. The organisms most often found are the pneumococcus and streptococcus pyogenes; the encapsulated bacillus

has been observed, but some have doubted that the bacillus influenzae is the sole cause of the purulent effusion. The pleural affection can coexist with other bronchopulmonary manifestations, or supervene either after a lobar pneumonia or after a bronchopneumonia. Laveran has observed 5 cases of influenza pneumonia with purulent pleurisy requiring operative intervention. Similar cases have been reported by other observers. Letulle mentions a case of left interlobular pleurisy caused by the encapsulated bacillus of Friedländer; and he also tells of 3 other cases of grippal empyema. Fraenkel declares that cases of purulent pleurisy have been observed, the same turning putrid owing to a concomitant pulmonary gangrene. Duponchel reports an interesting case in which the auscultatory phenomena were not suggestive, and in which there was suddenly produced a vomica resulting in unsuspected interlobular pleurisy. Even after operation for empyema in certain influenzal purulent pleurisies, there may be established a fistula with suppuration lasting for two or three years and necessitating thoracoplasty. Verneuil illustrates this condition.

BUCCAL CAVITY.

Influenzal cases may show in the oral cavity catarrhal conditions and ulcerative stomatitis. The lesions most often observed in connection with the teeth are suppurative alveolar periostitis, with surrounding inflammatory lesions; there may also be gingivitis and aphthous conditions. A sharply defined and at times an intense unilateral redness of the hard palate, with displacement of the uvula, have been described. Shelly mentions what he considers a constant sign in influenza, consisting of a pathognomonic vesicular eruption of the velum palati, and characterised by little translucent elevations like grains of sago. Koplinsky has described a similar sign comprising small convex elevations, which are transparent or of a bluish or pearly hue, lying on a red basis on the velum palati. The tongue in severe cases is frequently coated very thickly. Frank describes a swelling of the papillae of the anterior part of the tongue, the same occurring about the second or the third day. Another sign which has received considerable importance in certain quarters is, according to Chryssovergis, a simple or intense erythema with fine granulations on the velum palati; in some patients there may be observed red areas of irregular outline, resulting sometimes in ulcerative conditions and the formation of false membranes. This author has noted, amongst other things, in certain cases sometimes gingivitis, sometimes an active erythema with swelling on the anterior and posterior surface of the lips. Superficial ulcerations followed erythematous patches, and occasioned great pain. The tongue in some instances showed redness and desquamation, in others swelling in the neighbourhood of the papillae, giving the impression of red patches. In three cases specimens of the mucous material raised from the pharynx revealed enormous quantities of influenza bacilli. He tells us also that in one of the

epidemics which he studied the influenzal manifestations were localised in the large intestine, giving rise to spasms as well as more or less excruciating pains in the left iliac fossa. In certain cases this pain was located in the right iliac fossa, and there simulated that of appendicitis. A half of the cases showed dysenteric and tenesmic symptoms and gastric evacuations. According to him, congestion is the fundamental lesion in this disease. Lemoine reports cases illustrative of grippal stomatitis with numerous aphthae and tiny ulcerations of the lips, tongue, and inside of the cheeks.

PAROTID GLANDS.

In occasional instances these structures become inflamed and suppurated. Stoll and Heberden drew attention to parotid affection as far back as 1775; and parotitis has been observed in recent epidemics, accompanied sometimes by various suppurative troubles due to the streptococcus. Lemoine reports three cases, in soldiers, in which parotitis appeared to be associated with erysipelas, angina, and pneumonia. In one of Jarres's cases the same complication coexisted with suppurative infarction of the lung from the streptococcus pyogenes aureus. Lemoine describes also four cases of parotid swelling, recalling mumps and in three of them having erysipelas of the part retarding convalescence. In 1889, Fiessinger had six patients with parotitis in the course of influenza, and he considers the accident to be due to a special localisation of the bacilli in the gland.

TONSILS.

Great difficulty in swallowing may be experienced owing to the great swelling of the tonsils in this disease in certain cases. The brunt of the attack may fall there in the first instance, swarms of bacilli being found in these structures. The angina induced is diffuse and very like the diffuse catarrhal idiopathic disease. The palatine, pharyngeal, and lingual tonsils may be secondarily infected and a phlegmonous inflammation induced. Of the streptococcic pyogenic infections which may be observed in this region there may be mentioned phlegmonous peri-amygdalitis, inflammation of the retro-pharyngeal and cervical glands, and sometimes diffuse phlegmon of the pharynx and of the base of the tongue.

PHARYNX.

A sign, which in the opinion of Franke is pathognomonic of influenza, is the occurrence of an intense and circumscribed redness of the anterior pillars of the fauces; he describes it as a band measuring from 2 to 7 millimetres with a fan-shaped radiation to the level of the uvula. Chryssovergis thinks that the occurrence of palato-pharyngeal erythema points to the existence of intestinal form of influenza. Leyden holds that grippal pharyngitis is specially characterised by a diffuse and haemorrhagic tumefaction of the entire mucosa. The anginose condition in this disease have been noted by Barthélemy to be sometimes accompanied by a scarlatiniform eruption; and others describe an erythematous pharyngitis as more or less constant in influenza in children.

STOMACH AND INTESTINES.

It is only in occasional instances that lesions of the gastro-intestinal tract are observed. Jürgensen

mentions severe ulceration of the gastric and intestinal mucous membrane, and at the same time the submucosa, and also in part the muscularis, were oedematous and the seat of cellular infiltration just as in the incipient stage of phlegmonous gastritis. Weichselbaum also has described marked affection of the stomach and intestines, and, especially in one case, a very severe inflammation of the mucous membrane of the ileum with haemorrhagic manifestations. Gillet mentions tumefaction of Peyer's patches and of the solitary glands. Max Flesch and others have described serious lesions as perforation of the small intestine near the duodenum. The author just mentioned reports the case of an infant of ten weeks who had been artificially fed, and who showed at the autopsy atrophy of the mucosa of the jejunum, as well as great infiltration of Peyer's patches, of the ileum, and enlargement of the mesenteric glands. It would appear that in the dysebteric or choleraic forms the lesions have not been very fully described by an observer. Merklen mentions 3 cases of influenza appendicitis which did not require operation; here the grippal affection seems merely to have augmented the virulence of the normal intestinal organisms. In certain instances, particularly in infants, the mesenteric glands may be enlarged in the same way as those of the axilla, of the mediastinum, etc. In the colic form described by Chryssovergis there exists, as already mentioned, a palato-pharyngeal erythema of some significance. In the typhoid form of influenza, accompanied by diarrhoea, stupor, etc., the colon bacillus may be observed, but never that of Eberth. In one of Siredey's cases the integrity of Peyer's patches was demonstrated; and the same observation has been made by Monié, who failed also to find any alteration in the intestinal mucous membrane.

SPLEEN.

Enlargement and displacement of the spleen in influenza has been observed by various authors, e.g., Babes, Widal, Ribbert, and Chantemesse. Duponchel says that he has seen enormous splenic enlargement in several cases of pneumonia with empyema. This splenic congestion is particularly apt to occur in the typhoid form of the disease. According to G. Stewart, it is this hypertrophied organ which elaborates the chemical substances formed by the bacillus influenzae. Numerous influenza spleens have been examined by Kouskow; in some cases it was diminished in volume. Amongst the pronounced lesions which he observed were such as a grayish-violet and reddish speckling of the capsule, softness and friability of the pulp, and an indistinctness of the Malpighian corpuscles. Haemorrhages were frequent; and he also not uncommonly noted necrotic areas, with desquamation of the endothelium and obliteration of the vessels.

LIVER.

Hepatic lesions are comparatively rarely observed, unless perhaps in the intestinal form of influenza, when it is not so rare as supposed to find an augmentation in the volume of the organ. Weichselbaum saw it affected with a cloudy swelling in only 2 cases. Pfuhl, however, says that in one of the cases in which death

followed, profound changes in the central nervous system, he found the interstitial tissue of the liver more markedly developed than is generally the case, the capillaries well filled, and the liver cells cloudy and granular. In certain parts of the hepatic lobules he described the finding of irregular accumulations of small round cells, partly in the centre of the lobules, partly in their periphery; in numerous places, likewise in the centre of the liver lobules, there existed peculiar, more or less circular, oftentimes pretty sharply defined structures, which with a low power and on superficial observation gave one the impression of vascular coils similar to those of the kidney. Observed more carefully with a high power, these were found to consist of a fine net-like tissue whose meshes contained small round cells similar to unstained blood cells. In certain of these structures could be seen a more or less distinct destruction of cellular elements, free nuclei, and detritus. Now and then the reticular structure was present only in certain parts. In these bodies he found also the bacilli which were described by him. He is not inclined to place in the group of the so-called lymphomata those round structures in which the projections of small round cells run between the neighbouring lines of the hepatic cells, oftentimes up to the lobular vein. He questions whether these changes in the liver tissue are to be attributed to the bacilli, or whether there exists a coagulation necrosis, which is the result of toxic causes. Often icterus of various degrees is found, which is to be looked upon as of congestive origin from catarrhal swelling of the mucous membrane consequent upon closure of the larger bile ducts. At one of his autopsies Jürgensen found a subdiaphragmatic abscess, larger than the fist, and situated behind the left lobe of the liver and the spleen; the bile ducts and gall bladder were enormously dilated. According to Rendu, hepatic congestion with jaundice is to be found in cases of cellular lesions giving rise to a transformation of haemoglobin into urobilin. Tédenat has seen an absdess of the liver in this disease contain from a litre to a litre and a half of pus. Aron and Belinie each describe a case, with autopsy, of grave icterus of grippal origin, in which they noted characteristic lesions. Deverre mentions several cases of the same condition. In one of them, the liver was greatly enlarged and presented on section a series of cavities filled with a greenish serous pus. Microscopical examination revealed the presence of a newly-formed connective tissue showing embryonic cells. The hepatic cells presented pigmentary atrophy; their nuclei did not stain; they were angular and their protoplasm was translucent. In another case he observed streptococci in the capillary vessels and bile canaliculi.

KIDNEYS.

These organs not infrequently show changes in influenza, but they are not usually severe. Babes describes parenchymatous lesions, and Weichselbaum a cloudy swelling. Ribbert found at one time cloudy swelling, at another fatty degeneration of the uriniferous tubules. In the hardened preparations he observed in the

capsules of the glomeruli some coagulated albumin. A very marked case of glomerular nephritis was observed during life by Leyden, and the diagnosis was confirmed after death. In this case the gray substance of the kidneys was reddened and already in the first stage of the nephritis, and microscopically presented that appearance which is the most typical form of renal inflammation following acute infectious diseases, viz., that to which the term scarlatinal nephritis has been applied. The occurrence of renal changes is suggested during life by the frequency of albuminuria. Haematuria sometimes heralds a catarrhal nephritis. In the septicaemic forms the accompanying nephritis has various determinations, e.g., angina, orchitis, endocarditis, pseudo-rheumatism, etc. Tuvache remarks that grippal nephritis is often overlooked or neglected, and has therefore the tendency to indefinitely prolong convalescence. Temporary glomerulitis, acute haemorrhagic nephritis, acute Bright's disease, cystitis (sometimes haemorrhagic), and orchitis are some of the complications that may be encountered in influenza. Breton refers to a case of chronic post-influenzal nephritis coexistent with an aortitis. In one of Siredey's cases, in which there had been an infection with the colon bacillus, the post-mortem examination revealed an intense nephritis with a large infarctus of the left kidney. Oftentimes an influenzal attack aggravates a pre-existing renal affection; doubtless this obtained in a case of pyonephrosis, described by Desnos, characterised by renal tumour with pus in the urine. Lumbar nephrotomy allowed the escape of a litre of creamy pus containing numerous streptococci, and a large and irregular calculus was discovered in the pelvis of the organ.

BLADDER.

Influenza has been known to give rise to cystitis, as will be shown later on.

PROSTATE AND URETHRA.

Desnos, amongst the urinary complications of influenza, includes prostatitis and urethritis. In one of his cases the prostate attained the size of a small orange. It may happen that an influenzal attack rejuvenates a latent and chronic urethritis, which extends to the prostate and there gives rise to an abscess.

CIRCULATORY SYSTEM.

HEART.

The heart not infrequently is affected in some way during influenza. Jaccoud refers to the occurrence of endocarditis in a case in which a general pyaemic infection originated in a focus of suppuration in the lung, and gave rise to cardiac disease. Endocardial inflammation was observed in a similar case reported by Verneuil; and in one of Letulle's cases the autopsy revealed a suppurative pericarditis. According to Huchard, in certain pyaemic forms, by reason of its extension by successive localisations, the endocardium is not infrequently attacked. The myocardial lesions, apparently of the same nature as those encountered in infectious diseases, are usually manifested clinically by alarming symptoms to be considered later on in

detail. It is possible, as Huchard supposes, that the slowness of the pulse, the syncopal condition, etc., are more the outcome of pneumogastric paresis than of a myocarditic lesion properly so called. According to Fraenkel, in the majority of fatal cases there exist cardiac lesions coincident with that which he terms the pneumonia of influenza. Amongst the more common accidents Letulle describes infectious endicarditis with cyanosis, chills and death. It does not appear that these observations were autopsically confirmed. Camescasse says that he has seen influenza accompanied by pancarditis. Jehle has encountered, in 2 cases of grippal endocarditis, Pfeiffer's bacillus in the aortic valves; in one case it was there found in pure culture, in another in mixed infection with the streptococcus and other organisms. According to him, the bacillus influenzae may be transported both by the lymphatics and the blood-vessels. In one of Galliard's cases endocardial invasion was clearly demonstrated. In another, in which the sputa contained pneumococci, auscultation revealed an intense and prolonged systolic murmur. Renoy has seen endocarditis complicating influenza, particularly in children. According to Ménétrier, endicarditis is more often observed in influenza pneumonia than in the common and ordinary form of inflammation of the lungs. Legendre describes the occurrence of pericarditis with effusion after influenza. Batz mentions his observation of various grippal cardiopathies. He says that the pericarditis never presents haemorrhagic effusion, but often a purulent tendency from microbic infection. There may be found an ulcero-vegetative form of endocarditis exhibiting a preference for the cusps of the aortic valves, and due to various bacteria. Henschen, of Upsala, describes acute dilatation of the heart in influenza. Warfringe has seen 2 cases of it and confirmed the clinical diagnosis by post-mortem. It is especially dangerous in the case of alcoholic patients. Cornil and Barié have published a very interesting observation of vegetative mitral endocarditis in influenza, due to the streptococcus, followed by rupture of the large valve of the orifice and aneurism of the smaller valve.

BLOOD-VESSELS.

Vascular lesions are frequent in influenza, especially phlebitis. In Ferrand's case the blood contained the streptococcus. In another described by Burlureaux, there was a popliteal phlebitis; it was accompanied by delirium and ended in death. Phlegmasia alba dolens has often been reported in the course of influenza; from the pathological and bacteriological standpoint there is nothing special to be noted in connection therewith. Arterial lesions are not rarely observed. Fraenkel has thrice demonstrated arterial thromboses: once in particular a thrombosis of the central artery of the retina, and in another case acute arteriosclerosis. Breton has seen an acute aortitis occur unexpectedly during the convalescence of influenza, subsequently giving rise to cardiac and renal accidents. Radioscopic examination revealed a slight dilatation of the arch of the aorta, and the clinical phenomena were unmistakeable. Weinlecher gives a good description of a temporal aneurism following

influenza;there were two enlargements separated by a constriction at the level of the zygomatic apophysis. In a similar case Teleky saw all the symptoms disappear of their own accord.Acute inflammation of the arteries in the course of influenza are,according to Boisramé, analogous to those of typhoid fever,and attack aged individuals.The condition is manifested by an indurated cord,with discoloration of the overlying skin,and not infrequently terminating in gangrene;for the relief of this condition an operation may be urgently required. Duchesneau describes a case of gangrene of the limbs following influenza.The skin became violaceous,and there occurred a blackish gangrene,of a dry character,in the right leg with a mummified appearance.In a similar case of Dor's the feet and legs became bluish-black in hue. Loison,in February,1890,presented to the Medical Society of Lyons the left lower limb of a man of seventy years, which had been amputated for gangrene after a mild attack of influenza.Drasche says that he has seen sanguineous suffusions under the skin of all the fingers of one of his influenza patients.

NERVOUS SYSTEM.

BRAIN.

Severe hyperaemia of the meninges of this organ may be found at the autopsies of influenza subjects; Jürgensen says that he has seen several cases.Kundrat describes 3 cases of cerebrospinal meningitis,of which one was combined with cerebral abscess.Leichtenstern found intense cloudiness and haemorrhages of the pia on the convex surface,and here and there purulent infiltrations in the neighbourhood of the veins.Numerous haemorrhagic,softened,diffuse,greenish-red areas were observed by him at the convex border of the organ.Similar cases have been reported by others.Weichselbaum describes a condition in which thick pus was found between the dura and the posterior wall of the right frontal cavity,which was also filled with pus.In one place the dura was swollen,infiltrated with pus,and discolored;the pia was also not of normal hue.In the right frontal lobe there existed a pus cavity of the size of an orange and with haemorrhagic wall,which reached to the anterior part of the brain.The ventricles of the brain also contained pus.Babes mentions a case of purulent basilar meningitis with occasional extension to the convexity. The ventricles were filled with a very cloudy liquid, and the substance of the organ was oedematous and hyperaemic.In one of the cases studied by Pfuhl he found the veins of the dura mater engorged,and here and there adhesions between the dura and pia,and within these adhesions whitish deposits;in other places he found within the pia mater covering the olfactory nerves,as well as on the under surface of the crus cerebri,glassy, grayish-white deposits,oedema of the brain,and marked dilatation of the ventricles with accumulation of reddish serum.In the same manner the pia mater of the spinal cord showed a venous congestion;posteriorly there were occasional adhesions to the dura mater,and the central part was transformed into a calcareous mass, in which the nerve branches were partly embedded;there

was considerable softening of the spinal cord itself. One of his other influenzal subjects showed whitish, calcareous masses on the pia mater, just at the edge of the great longitudinal fissure, from which white streaks ran in the direction of the cerebral groove; there was exfoliation of the convolutions, the brain substance was moist and anaemic, and abundant serum was found in the lateral ventricles. In yet another case he observed filling of the pia with blood, cloudiness of the same, and granulations at the edge of the great longitudinal fissure, with accumulation of fluid and cloudiness in the neighbourhood of the optic chiasma, serous exudation in the fossae of the skull and in the cavities of the brain, especially the large lateral ventricles, and abscesses in the right lobe of the cerebellum. In other cases the purulent area was found in the left frontal lobe. His cases are of special interest because his belief is that he found the influenza bacilli in all of them. The bacilli were always found within the blood-vessels. Upon subjecting cut sections of the cerebrum, cerebellum, and spinal cord to microscopical examination, he saw in the pia an extraordinary amount of blood, dilatation and at times an increase in the number of the capillaries, as well as in certain places very small exudations into the nervous tissue itself. Moreover, in these places he found a few influenza bacilli in the normal blood-vessels, as well as in the haemorrhagic foci which were undergoing more or less change. While in the neighbourhood of the capillaries and some of the larger vessels there was a great collection of round cells, he found in the central nervous system proper, in the cortex of the brain and white substance, no particular abnormalities. The cellular elements were especially free from bacteria. In numerous sections of the cerebrum and cerebellum he found genuine thromboses; the capillaries of the cerebral cortex were very rich in these, and even with a low power he could recognise the points of obstruction in the section, partly as tortuous, partly as ramifying figures which were stained a deep red. The thrombi were composed either entirely of very small bacilli or of these plus a coccus without a capsule, or finally chiefly of the latter. Brione mentions a purulent meningitis of the base of the brain and an acute ascending paralysis.

SPINAL CORD.

The spinal cord was found by Foà, in one of his patients who died in the course of influenza from bronchopneumonia of one lung and hepatisation of the other, to be entirely filled with blood, its substance studded with small red areas; microscopically numerous haemorrhagic foci were found in all parts of the spinal cord, particularly in the upper two-thirds, and in the upper third of the cervical portion. In some places degenerative changes could be seen, the eighth nerve was enlarged from five to six times its normal size, and the nerve fibres were degenerated. The haemorrhagic areas were especially located in the posterior horns, almost always at the periphery; the degenerated areas for the most part in the lateral horns. The gray substance and the posterior horns were not in the least altered. In 11 autopsies,

Hetweg found as a constant sign a very marked hyperaemia of the entire central nervous system, such as is otherwise never encountered. The arteries at the base of the skull were particularly engorged with blood, and the consistence of the cerebrospinal axis was always increased. He considers this hyperaemia as a forerunner of inflammation and as peculiar to influenza.

PERIPHERAL NERVES.

Katicheff described peripheral neuritis in influenza located in the great sciatic, the great auricular, and the anterior occipital nerves. Peter has seen what he regards as a pneumogastric neuritis. Mossè mentions polyneuritis with ascending paralysis. The syndrome of Landry is not rarely observed after influenza. Boutin considers this as suggestive of a lesion of the peripheral system of nerves. Leyden, at an autopsy on a subject of influenza in whom it was observed, found a swelling of the axis cylinders of the medulla, with tumefaction and rounding of the ganglion cells of the gray matter. According to him, the acute ascending paralysis may be excited either by a polyneuritis or by a bulbar lesion. Senator thinks that the brunt of the grippal attack falls on the spinal cord. Jolly has seen a case of poliomyelitis, in a lady, in the third week of convalescence from influenza. Influenza polyneuritis seldom causes death. Degenerative signs are observed in the affected nerves, particularly in the median and posterior tibial. A somewhat considerable number of sheaths are to be seen enclosing several nuclei; here there will be observed others in which the myeline is transformed into globules. Cross sections of the posterior tibial clearly show under the microscope that the myeline has completely disappeared in the majority of the fasciculi. In the medulla the cells of the anterior horns, at the level of the cervical and lumbar enlargements, are altered, diminished in size, and charged with pigment; nearly all the cells have lost their prolongations. The muscles of the hands and feet show all the signs of degeneration-ad of a vitreous character and also of interstitial myositis.

EYES.

The ocular lesions of influenza have been well studied. The eyelids may be the seat of oedema, suppuration, erythema, etc. Conjunctivitis and keratitis are not rare, especially in the case of children. It would seem, moreover, according to Adler, that conjunctivitis was less often observed in the 1889-90 epidemic than in previous ones. An infective keratitis, of serpiginous form, has been described by Delacroix in convalescents. The epithelium may be infiltrated or presents yellowish spots, grayish striae or small blackish points. The herpetic form of ketatitis has been observed by Galezowski during the convalescence of the disease. Konigstein has seen conjunctival ecchymoses and ketatitis with vascular arborescences. Fusch mentions a case of tenonitis ending in suppuration, with bursting of the pus into the globe of the eye and loss of sight. The eye in one case presented perforations and the pus contained pneumococci. Bada l has observed blepharitis, impetiginous eczema of

the eyelids, hordeolum, phlegmon of the lachrymal sac, phlyctenular kerato-conjunctivitis, infectious keratitis, hypopyon, acute iritis and irido-choroiditis, acute glaucoma, etc. Adler reports a case of iritis with posterior synechia, and another characterised by acute symptoms of glaucoma. Galezowski describes a case of haemorrhagic retinitis with endarteritis. Lefrançais mentions one of a child who suffered during influenza from orbital phlegmon due to the streptococcus. Bergmeister has seen 2 cases of atrophy of the papillae, and Koenigstein one of retrobulbar neuritis. Billet and Grandmont tell of inflammation of the hyaloid membrane and miliary retinal haemorrhages. Macnamara publishes 4 cases of optic neuritis in influenza; in one of them, a man, totally blind for six weeks, there were signs of a papillitis with distinct retinal haemorrhages. There are other instances of ocular lesions which will receive detailed consideration in due course.

EARS.

Auricular lesions are by no means infrequently observed in influenzal subjects. Thus, Loevemberg, during the 1889-90 epidemic, saw several cases of moderately acute otitis. Comby, about the same time, observed in infants the periostitic form, sometimes with premastoid abscess. According to Malherbe and Bayce, the most important characteristic ~~characteristic~~ of grippal otitis from the pathogenic standpoint is that Pfeiffer's bacillus is not to be found in the pus or in the liquid on the membrana tympani and mucus of the external auditory canal. The researches of others on this point have also been negative. Moure says that in hyperaemic myringitis the tympanum is bright red with haemorrhagic points here and there. In certain forms of otitis one finds a serosanguinolent or purulent exudation. It may also happen that the pus finds its way into the cranium or lateral sinus. In the grave forms the entire petrous portion of the temporal bone may be implicated (panotitis), and the affection then presents a striking analogy to acute osteomyelitis. Mastoiditis of osteomyelitic form is not rare, and it sometimes is accompanied by symptoms of suppurative meningitis. The bacillus influenzae is not usually discovered in the haemorrhagic exudates of grippal otitis. Halle at one of his autopsies found an abscess occupying the whole of the anterior part of the petrous temporal, and communicating by means of the basilar process with the sphenoidal sinus; the lesion was also observed in the anterior cranial fossa.

SKIN.

Jarre, speaking of the frequency of suppurative accidents in influenza, describes the finding of boils and superficial abscesses under the skin. The grippal poison seems to him to be eliminated by the skin, thereon giving rise perhaps to herpes, eczema, and eruptive lesions, particularly in children. Cutaneous lesions have been described by several of the earlier writers on the subject, e.g., Van Swieten, Récamier, and Ozanam. Leloir describes the finding of pyodermatitis and acne in influenza. An important rôle ought, according to him, to be assigned to gastrointestinal intoxication in their

production;and he mentions that he has seen during a period of five weeks no less than forty instances of furunculosis in influenza patients who previously had never suffered from boils.In the case of a young woman he found in the mylohyoid region a red area of lymphangitis immediately under the skin.Boils appeared on the neck a few days afterwards.Various authors have described scarlatiniform erythemas,papular affections in numerous situations,and urticarial eruptions,etc.At the onset of influenza one may sometimes observe congestion of the face,with a slight oedema of the eyelids. Barthélemy has reported 2 cases of purpura,2 of herpes zoster,and various instances of such eruptions as the morbilliform,the scarlatiniform,and the pityriasiform. Discussing the vasomotor cutaneous lesions of influenza, Morel-Lavellée mentions an interesting case on which he bases the hypothesis of either a phlyctenular lymphangitis or an erythromelalgia,that is to say a neuritis marked by burning pain and redness of one or more of the extremities.One may encounter sometimes papules in a red basis.Eruptive forms of influenza were very common during the last pandemic.These manifestations,sometimes very embarrassing to the observer,have at times suggested dengue,scarlatina,or one of the exanthemata.Nothing is wanting in the clinical picture of the disease.The eruption is widespread and scarlatinous,as if the skin had been besmeared with the juice of a raisin.The likenes is still further increased by the punctate character and the appearance perhaps of a pultaceous exudate upon the tonsils.The fever,moreover,from the outset is less active than in influenza.The doubt as to the existence of scarlatina is soon,however,dispelled by the tracheo-bronchitis,the character of the fever,the sweats, the headache,and the general course of the disease. Pressure of the finger perhaps does not cause,as in an exanthemata,the momentary disappearance of the rash. Itching,absent in scarlatina,sometimes accompanies the grippal eruption.The enamthem and the swelling of the tonsils are very much less prominent in influenza. Finally,in the latter there is never any desquamation observed.A measly form of eruption is not often observed,but when it is,measles is closely simulated by the superadded coryza,laryngo-tracheo-bronchitis,morbilliform generalised erythema with large spaces of unaffected skin.The doubt,however,should not be of long duration,because influenza terminates more quickly,and even during epidemics,and also in the case of infants and children,the diagnosis should not affer any difficulties if the case be properly considered.

SYMPTOMATOLOGY.

In dealing with the history of the affection, I have shown that influenza may at times assume the most varied forms. Each epidemic takes on, as it were, a special character, and so much so, indeed, that in the course of the centuries the affection has received numerous popular designations, already enumerated. This in itself demonstrates the absence of unanimity in the clinical phenomena and the polymorphism of the disease. But if we carefully note the various descriptions of the morbific manifestations from time to time published in the past, we shall be able to discern in the midst of protean and inconstant clinical phenomena mentioned, a tolerably uniform group of symptoms interwoven with, and forming the basis of our description of, this remarkable disease.

Let us now consider the general course of the affection and thereafter deal with the principal symptoms in greater detail.

GENERAL SYMPTOMS.

The grippal seizure may exhibit the widest variations in individual cases as regards intensity, from a trifling indisposition to an illness of the most serious order, which may ultimately carry off the patient. In this respect, with the exception that the range of variation is greater, influenza resembles other acute infectious diseases. The variations are, however, to some extent related to, first, the previous health of the patient, his age, and the power of resisting morbid influences which he possesses; second, the character of the epidemic that happens at the time to be prevailing in his locality. Even in mild epidemics one may come across cases of very great severity. In every epidemic, however, the majority of the patients manifest the disease in a mild form, very many in what may be termed a rudimentary type. The disease has an incubation stage which varies from a few hours to two or three days. During this time the patient complains of little that is important. Influenza is of abrupt invasion, and in most cases the onset of the disease is marked by chilliness or a chill of moderate severity, which may be prolonged and repeated; fever rapidly supervenes. There is headache, usually severe, with pain at the back of the eyeballs, severe pain in the back, limbs, and joints and a general feeling of soreness, with tenderness upon pressure. These symptoms are accompanied by mental and physical depression, with malaise and restlessness. The forces of the circulation are notably depressed. The spleen is slightly enlarged. There is no characteristic eruption. The duration of the attack is from three or four to seven days, and the patient slowly thereafter returns to his normal health in uncomplicated cases. In mild cases the chill may be slight, transient, or absent altogether. The headache and muscular pain are of moderate severity. There is malaise; weariness upon bodily or mental effort; disinclination for exertion;

some difficulty in fixing the attention;and not infrequently some slight mental confusion.To these nervous disturbances are added catarrhal symptoms,such as coryza and erythematous angina and a tickling coughThe fever is slight,the temperature not rising above 101.F.,or the temperature may remain subfebrile throughout.A large proportion of the patients suffering from influenza in the milder form are able to continue their ordinary avocations.No very great amount of aggravation of the disease,however,is required to cause bed to be sought by the patient.The chill is more marked in the severer cases,and the shivering is more prolonged.Fever is rapidly established,the acme being reached within twenty-four or thirty-six hours.The temperature may rise to 104.-105.F.Sensations of heat alternate with chilliness. In many cases there are annoying sweats.Headache is intense;there is pain in the orbits and at the root of the nose.Sneezing,redness of the eyes and edges of the nostrils,a thin discharge from the nose,and lachrymation occur.Epistaxis is occasionally observed.The throat is sore;there is a tickling sensation in the upper air passages,hoarseness and sometimes,dyspnoea.The cough is paroxysmal,distressing,and at first unproductive. It occasionally causes vomiting like that which occurs in pertussis.There may also occur thoracic pains,stitches in the side,and the loss of taste and smell.In other cases the catarrhal symptoms are but slightly developed. The patient presents the symptoms of an acute infection of varying severity,beginning with chill and fever.There is great depression together with backache and pains in the limbs such as occur in dengue,with which influenza has been confounded,or smallpox.The appetite is lost;thirst,constipation,and diminished secretion of urine occur.The pulse may be full and compressible;more commonly it is feeble,small,and irregular.It is,as a rule,only moderately increased in frequency. In many cases there is slight blueness of the lips and finger tips;the patient is distrssseduby restlessness and want of sleep.At the end of four or five days the febrile symptoms decline,at times gradually,more commonly abruptly,and the defervescence is often accompanied by copious sweats,spontaneous diarrhoea,increased flow of sedimentary urine,and considerable amelioration of the subjective symptoms.The catarrhal symptoms outlast the fever two or three days,but eough and expectoration may persist for some time.During the attack there are evidences of profound disturbance of the functions of the nervous system.There is depression alike of the body and mind,with mental dulness,and in some cases delirium.Slight convulsions may occur;cutaneous hyperaesthesia is often present,and areas of burning pain in the skin are encountered.Very common and not infrequently severe,may be neuralgia,muscular pain,and aching in the bones. Clinical phenomena referable to the nervous system may dominate the clinical picture from the outset or may become prominent at any time during its course.Blinding headache,intolerance of light and sound,intense rhachialgia may be associated with delirium and a tendency to stupor.Painful rigidity of the muscles of the

back of the neck and general convulsions may occur. There may be intense fever or the temperature may be subnormal, with slow irregular pulse and breathing. There may be in other cases great prominence of the symptoms referable to the gastrointestinal tract, while those concerning the respiratory system are less urgent. There will be observed nausea, occasional vomiting, a heavily coated tongue, complete anorexia, gastric tenderness, slight tympany, and a tendency to diarrhoea. The attack may develop abruptly, with symptoms like those of cholera morbus. The fever and peculiar nervous depression, however, undergo no change. It may be also noted that cases occur in which there is but little of the usual tendency to localisation of the infectious process; the patient suffers from fever of varying intensity, with great depression and simultaneous and equal implication of the gastrointestinal, nervous, circulatory, and respiratory organs. In a large number of the cases herpes occurs. Urticaria is less common. One sometimes observes diffuse erythematous rashes and instances of purpura. Some writers have arranged the cases of influenza into various classes; in theory we may recognise a thoracic, cardiac, gastrointestinal, and a nervous variety. In actual practice, however, the various described types merge so gradually into each other, and are so modified by the individual peculiarities of the sick and by the complications which arise in the course of the disease, that there is, as a rule, but little to be gained by making a categorical arrangement a nosological essential. In the milder cases the attack lasts from two to three days. In well-developed cases without complications convalescence sets in between the fourth and seventh days. Severe cases with complications may be protracted for several weeks. About 10% of the cases relapse.

ANALYSIS OF THE SYMPTOMS.

GENERAL CONSIDERATIONS.

For the purpose of separate consideration it is convenient to take up the description of the principal symptoms in the following order; but it must not be forgotten that we encounter no little difficulty sometimes in deciding under which of these headings particular symptoms are properly to be classed, by reason of the close interdependence of the chief processes of the disease and the anomalies of its phenomena regarding from an all-round standpoint.

INCUBATION.

In many of the cases of influenza the incubation period can be definitely determined. Some cases have been reported in which the disease originated in a family in consequence of a definite importation, and in a number of instances medical practitioners have been able to determine in their own persons how many days after they visited their first and only case of influenza they themselves are attacked. After observations of this kind the incubation has been declared to be from two to six days. Very rarely it has been as brief as one or two days. Some have reported an incubation as short as only half a day, the disease occurring in the evening

after a morning infection. Still, it is possible that here an anterior infection may have unknowingly occurred. The longest period of incubation known seems to have been seventeen days.

PRODROMATA.

In influenza a prodromal stage is very short when present, but is usually absent. It may be characterised by an initial chill or by a series of slight and repeated chills, and accompanied by stiffness in the limbs, articular or periarticular pains, severe headache; rhachialgia, and especially by a profound prostration, occurring with remarkable suddenness and affecting both the body and the mind. The patient is not infrequently seized with great anxiety as if conscious of suffering from a grave disease. This prodromal period sometimes lasts for from twelve to twenty-four hours, and it has even been known to last over two days. The suddenness of the onset is striking; it is oftentimes as marked as in lobar pneumonia.

FEVER.

The temperature in uncomplicated cases of influenza rises rapidly to 101.-105. F. in the first twenty-four or thirty-six hours. From this it falls by a defervescence usually critical; sometimes by an interrupted crisis; sometimes by a rapid lysis. The temperature reaches the normal usually in the course of from one to four days; less commonly secondary rises of temperature occur after a afebrile period of one or two days - intermittent fever; or, again, the fall of temperature does not reach the normal, and is succeeded by a series of rises, defervescence occurring some time before the close of the first week - remittent form. The fever is therefore variable, and there is no constant relation between the height to which the temperature rises and the severity of the other symptoms; subjective distress may be moderate in patients showing a temperature of 104.-105. F., while other patients in whom the thermometer marks a fever of 101.-102. F. may suffer excruciating pain in the head, back, and limbs. The temperature rises early in the course of the disease, and may subside before other characteristic phenomena show themselves; or, again, the temperature may be still high when the headache, pains, or even the catarrhal symptoms, have subsided. If the fever continue beyond the seventh or eighth day, it will usually be found on critical examination that it is due to some complication, as a rule involving the respiratory system. The temperature curve due to the influenzal affection not infrequently merges into that of complicating bronchopneumonia, croupous pneumonia, or bronchitis.

PULSE.

There is nothing characteristic about the pulse in influenza. It is moderately increased in frequency, and very often with a high temperature it does not exceed 100. In some cases slowness of the pulse is observed. It is less forcible than in health; compressible even when full; often irregular, changing in character in the course of a few hours.

HEADACHE.

This is very constantly observed. It is sometimes

of great severity. The pain, for the most part frontal, is sometimes unilateral, suborbital, temporal or occipital, and is dull, oppressive or lancinating, giving place to a sensation of weight, constriction, pressure, or of giddiness. Bearable perhaps during the day, it is intolerable towards evening, and its intensity is often such during the night that it renders sleep impossible and causes the patient to groan with agony. The congestive irritability of the brain is such, moreover, at times that the least sound, the light of the lamp, the paroxysms of the cough become a veritable torture. The patient dreads these things, and when about to cough holds his head in his hands and closes his eyes. Hyperaesthesia of the coverings of the head not infrequently accompanies the cephalalgia, which may then assume the form of a violent migraine with hammer-like exacerbations. When of this severity the headache plunges the patient into a state of considerable mental depression, with attacks of somnolence, especially during the day. Night, on the contrary, is devoid of sleep, and the patient tosses about in bed, is anxious, depressed, and may even become delirious in consequence. In its severest form the headache is one of the characteristic symptoms of the nervous form of influenza.

PAIN.

Even in the apyretic forms of influenza various pains may be complained of; they may be fixed or wandering, in the muscles and in the joints, in the loins, in the course of the peripheral nerves, etc. This painful form of influenza characterised the great epidemic of the fifteenth century, described by Pasquier under the names of tac and horion. The pains in the limbs, the lassitude, myalgias, and depression were always mentioned in the earlier accounts of influenza. In some cases there may be torticollis, in another lumbago, and in certain cases severe pains in the intercostal muscles and lower limbs. Coexistent therewith may be an extreme debilitation of the whole body. The intense lassitude and fatigue are such that the patient is scarcely able to move, and are disproportionate to the apparent benignancy of the disease and may greatly retard convalescence. The articular or arthralgic pains are also noteworthy, and are less frequent than myalgia which may merge into a pseudo-influenzal rheumatism.

Neuralgia may either accompany the headache or replace it. The trigeminal form is most frequently encountered. Bidon-retro-ocular pains which coincide with dizziness and vertigo and cranial hyperaesthesia, especially in the case of children. Dubois has treated many cases of sciatic neuralgia and its branches. Neuralgic affections in the submammary, scapular, and cubital regions, etc., were, according to Fèréol very common during the last pandemic. About that time several cases were observed of post-influenzal scapulo-humeral neuralgia, with irradiations to the ends of the fingers. In some patients the neuralgia very closely similates a masked malaria. Krall has published some cases of neuralgia of the ciliary nerves, which he regarded due to the influenzal

toxaemia. In four patients he noted very severe pains in the eyes, but without any sign of accompanying inflammation; these spontaneous pains appeared neither during movements of the eyeballs nor after the exercise of pressure on the trigeminal nerve; there were no visual motor disturbances.

SKIN.

During the course of the fever the skin is hot and dry; more commonly there is sweating from the outset, often continued throughout the course of the disease, and frequently being very marked during convalescence. Sudamina occur. The face is often flushed, and there are erythematous mottlings of the skin, especially upon the neck and chest. Other forms of erythema, and especially erythma nodosum, have been frequently observed. Urticaria is not uncommon. Herpes labialis is often seen in cases not complicated by pneumonia.

FACIES.

There are some who claim for influenza a special facies. In certain serious cases the features are indeed altered, particularly when there is prostration, torpor, and somnolence as in enteric fever, and particularly when peritonitis and other intestinal disturbances are present. Triboulet speaks of a case in which the earthy cachexia of the patient suggested a septic or abdominal affection; the facies partook of the influenzal aspect with a pinched appearance of the nose and features and movement of the alae nasi.

TONGUE.

There have been some who have attached a somewhat considerable importance to the condition of the tongue in this disease. Faisans, realising how much influenza is difficult to diagnose from the host of other diseases which resemble it, holds that the various writers on the subject have paid too little attention to the appearance of the tongue. According to him, and his opinion is based upon numerous clinical demonstrations, the tongue is neither white nor whitish-yellow nor dry, etc., but is sui generis, and entirely different to what is seen in any other affection, especially in the ordinary cases of moderate severity. He writes somewhat to the following effect: The influenza tongue undergoes no alteration in shape; it is neither large nor thick as in certain gastric affections, nor small, contracted and pointed as in enteric fever. In certain cases it is perhaps slightly flattened, as it were, but more often it retains its normal form and dimensions. It is usually moist, and when dry points to the approach or arrival of some inflammatory complication. It is glossy and smooth, without roughness and without furrows, and the papillae have lost their usual prominence. But what constitutes the peculiarity of the organ is its colour. It is bluish-white like porcelain, this tint reminding one of that of certain patches of buccal leucoplasia or, better still, of buccopharyngeal mucous patches; in short, the tongue is opaline. This opaline coloration is at one time uniform, at another spotted; in the former case the organ appears as if its entire surface were covered with a

very delicate bluish-white transparent enamel, which has everywhere the same appearance; in the second case the median part of the tongue and its root are uniformly opaline, but the lateral parts and the tip seem to be speckled with very small round spots, the same showing the above-mentioned opaline tint, but more clearly, or even a bright red hue. These two varieties of grippal tongue appear to our author to be equally common, and also equally pathognomonic; and he affirms that scarcely even in articular rheumatism one observes a tongue with characteristics so significant as this, and that in this case the organ is not so glossy and of a more decided blue tint. The opaline coloration is not due to the presence of an overlying coating, as one may scrape and scrub the organ without removing it. If the influenzal attack is accompanied, as it very often is, by catarrhal conditions of the digestive tract, the tongue undergoes modification: it increases in size, thickens, and is covered at its base and down the middle by a more or less important gritty material. Nonetheless, it does not cease to be characteristic, because one observes the uniform or speckled opaline covering at the sides, edges, and tip of the organ. When some such serious inflammatory complication as pneumonia occurs, the tongue as often as not remains in the above-described condition, but not infrequently also it tends to become dry. If the dryness is general and pronounced, the opaline tint disappears; but this is not usual in grippal pneumonia, and there are very few cases indeed that one cannot detect the opalescence at least on the edges of the tongue. This opaline character makes its appearance during the first two or three days of the influenzal attack. It invariably lasts as long as the disease itself, and is not infrequently the only sign that justifies the assertion that the patient is not yet recovered. Now, as long as the tongue has not returned to its normal condition the cure of the disease has not been affected, and the patient is open to the occurrence of recrudescences or so-called relapses, when he is liable to the same accidents as before. Finally, says our author, the grippal tongue strenuously resists the action of all kinds of purgatives, emetics, and emeto-cathartics. When there is a coexistence of the gastric and grippal elements on the tongue, aperients will not infrequently cause a disappearance of the dyspeptic fur, but utterly fail to affect the opaline coating. It should be noted, however, that our author's observations have not been sufficiently confirmed to warrant us in taking his sign as pathognomonic of this disease.

GASTRIC SYMPTOMS.

Impairment of appetite, nausea and vomiting are not infrequently observed in influenza. Such troubles may be noted not only at the onset, but at any period of the disease. But in many cases, especially the nervous, the appetite may not be lost, that is to say, when the function of the digestive tract is preserved. There sometimes may be noted a kind of gastric distress to which it is convenient, according to Huchard, to apply

the term infectious gastric embarrassment. In this case there is total loss of appetite, the spleen and the liver are increased in size, the stools are foetid, heart failure is threatening, and prostration is extreme. Even in moderate cases gastralgia is not rare, anorexia may be complete, and thirst is great. Nausea and vomiting may be excited by the exhibition of certain medicaments. Constipation, absolute during the first few days, is sometimes replaced by a more or less severe diarrhoea. Incoercible vomiting, gastric irritability, paroxysms of gastric pain, and dysenteriform or choleriform are features of the gastrointestinal form of influenza. Children suffer nearly always, according to Comby, from nausea and vomiting at the onset of the disease. In 118 cases he observed 98 of bilious vomiting with glairy stools, and 37 of simple nausea. Sometimes vomiting merely marks the invasion of the affection and is observed no more, but in many cases it occurs several times a day and is continued for about a week. Comby describes the case of a nursling which returned the mother's milk in clots after each feed, and says that such regurgitations continued throughout the whole of the disease, viz., for seven days. In infants also, according to him, one may observe the development of a marked redness on the velum palati, the faucial pillars, and the posterior wall of the pharynx, in such a way as to simulate a diffuse erythematous pharyngitis. The diarrhoea observed may be scanty, greenish, foetid or melanic. The adult patient may suffer from buccal or dental complications; there may be pain in the gums, more or less extensive ulcerative stomatitis, and irregular or circumscribed ulcerations. More often there is only a simple gingivitis, but sometimes there appears alveolo-dental periostitis with suppuration. Toothache is common, especially in the wisdom teeth. I have already described the occurrence of certain erythematous or vesicular eruptions situated especially on the velum palati, and regarded by some as of great importance and by others as next thing to pathognomonic. During the last pandemic, Chedevergne says that he observed in nearly all his patients either pharyngitis or tonsillar angina, the same not being of a serious character and the patient sometimes not being aware of the existence thereof. It obtains, as a rule, in influenza of the abdominal form giving rise to extremely obstinate constipation.

ANGINA.

A diffuse form of angina, but one without characteristics allowing it to be differentiated from diffuse catarrhal idiopathic angina, has been described by Escat. On a superficial inflammatory basis there may become engrafted localised lesions or superficial ones, in the case of one or both tonsils in the throat or that in the pharynx or the lingual tonsil. In this case the patient experiences great lassitude and depression of the nervous system, of which, says Escat, the intensity is disproportionate to the local manifestations. The other pharyngeal localisations of influenza comprise such affections as phlegmonous amygdalitis or peri-

amygdalitis, retropharyngeal adeno-phlegmons, and also latero-pharyngeal and cervical; finally, there may arise certain even graver septic infections, such as diffuse phlegmon of the pharynx and base of the tongue.

ENLARGEMENT OF THE SPLEEN.

The frequency of enlargement of the spleen has been variously estimated. Laveran and Chantemesse, its occurrence demonstrated after observing a very large number of leucocytes in the blood of influenza patients. Comby considers this exceptional. Indeed, Laveran found an actual diminution in the volume of the organ in 4 out of 5 cases, one only exhibiting the hypertrophic condition. Guyot, on the other hand, found the weight of the spleen in one case to be 610 grammes. Chantemesse, in the case of a woman who had succumbed to influenza, noted that the organ was twice as large and as heavy as normal. According to Teissier, hypertrophy of the spleen, when of early occurrence, may attain the diameter of four fingers, this lasting for at least three or four days. Return to the normal dimensions oftentimes occurs in a few hours, though the former enlargement returns forthwith on relapse of the disease. Numerous authors insist on the constancy of splenic enlargement in influenza, and Mangoubi is one of the many who claim to have established it. He made careful observations in numerous cases and found that the diameter of the organ varied from 13 to 18 centimetres. The abnormality is only seldom observed after convalescence. During the last pandemic Chantemesse and Widal noted a coexistence of generalised pulmonary congestion with hypertrophy of the spleen. Other concomitant affections have been observed.

BLOOD.

The bacteriological findings have already been detailed. The uncomplicated form of influenza is not characterised by leucocytosis. This fact is somewhat difficult to reconcile with the infectious nature of the disease, though it is in accordance with the catarrhal character of the essential lesions. Influenza would seem to be the only bacterial disease, beginning acutely with marked chill, which fails to induce a notable increase in the number of leucocytes. The fact that there is no leucocytosis in influenza appears to have first been demonstrated by Rieder who, in 7 cases, found that the white cells at the acme of the disease were actually reduced in number. In the catarrhal pneumonia which complicates the disease and which is distinguished by signs of incomplete consolidation, he found little or no leucocytosis. In post-influenzal lobar pneumonia the usual leucocytosis was observed. Others have observed no difference in the leucocytosis of lobar pneumonia following influenza from that of primary pneumonia. Cabot reports the examination of the blood in 67 cases, most of which showed normal or reduced numbers of white cells, and complications were usually present when there was slight leucocytosis.

URINE.

There is usually a diminution in the quantity of urine voided, but sometimes a temporary suppression is observed. In general, it shows little change, and is not

commonly, as in other febrile diseases, concentrated and high coloured. It deposits on cooling a sediment of urates, which is often towards the end of the fever very abundant. Defervescence is in many instances attended by a copious excretion of urine. Albuminuria occasionally occurs, especially in complicated cases. Griffiths and Ladell isolated from the urine in influenza a toxic fever-producing ptomaine which caused death in animals in eight hours. The substance was found to be a whitish crystalline, soluble in water of slightly alkaline reaction, and having the formula $C_9H_9NO_4$. According to Graves the urine contains, even in simple cases, a large amount of uroerythrine or purpurine. Fiessinger has not infrequently observed albuminuria, and the latter, Le Gendre holds of constant occurrence. The phosphates seem to undergo no change. In certain cases haematuria may occur from renal congestion or acute nephritis. Hayem has never seen a decrease of urobiline. Alison has given considerable attention to the urology of influenza and says that it is notably diminished during the first few days, but commences to increase forthwith on the occurrence of convalescence. Clear when voided, it gives thereafter a reddish or yellowish deposit which disappears under heat and potash. There is no decrease in acidity, and the specific gravity is slightly increased. The uric acid is augmented and may reach 1 gr. 80. and the same is true of the peptones. Our author found albuminuria in grave cases, who also noted a great abundance of urobiline and biliary pigments in grave pneumonias and meningitis in this disease. Huchard says that he has demonstrated the constant diminution of the phosphates and, amongst other things, the urates. Gautrelet mentions augmentation of the indican and urinary hyperacidity. Chapelle insists upon three facts, viz., hyperacidity, notable increase of the phosphoric acid, and richness in pigments; and he confirms the existence of Neucki and Lieber's urorozeine, as well as in certain cases Brieger's sulphocyanide derivative and scatol. According to Laumonier's urological observations in the case of children, there are four principal phenomena, viz., diminution of the coefficient of nitrogenous oxidation, increase of the coefficient of leucocytic activity (nitrogen of the uric acid to the total nitrogen), of the coefficient of toxicity (nitrogen of the extractives to the total nitrogen), and of the coefficient of phosphatic mineralisation. There have also been noted excess of urobiline and the presence of indoxyle and urohaematine, as well as traces of albumin in many instances. The outcome of all this, according to our author, is that the quantity of urea is slightly decreased, but this diminution seems to him not to have as great a significance as the decrease in the coefficient of nitrogenous oxidation, which is evidenced by the incomplete transformation of the nitrogenous waste. This is due to the considerable destruction of the leucocytes, a destruction due, as Robin has shown, to uratic discharge. The destruction of blood cells explains the increase in the urine of the derivatives of haemoglobin, urobilin, and urohaematin. The last-mentioned and indoxyle are due to

intestinal putrefaction. This globulolysis is explained by the diminution in the blood of a number of erythroblasts and of the corpuscular and haemoglobin content. Laumonier holds that the urology of the affection in children indicates with great precision the progress of the systemic contest of which the economy of the infected individual is the scene. The whole question is, however, by no means settled.

CATARRH.

There is invariably present in influenza a more or less extensive hyperaemia of the mucous membrane of the respiratory tract: indeed, it may be said to be characteristic of the disease. There is coryza, often severe. The eyelids may be swollen and reddened; there is lachyrmation; sneezing is frequent, and in many cases there is an abundant discharge from the nostrils. Erythematous angina, with tickling sensations and difficulty of swallowing, is very frequent. In many cases the catarrhal symptoms are restricted to the upper air passages. Implication of the larynx is shown by huskiness of loss of voice. Hoarseness is commonly observed. Among 218 children treated at his dispensary Comby observed 63 cases of catarrh; however, in children he observed the rarity of bronchial catarrh. Nasal catarrh was invariably observed in adults by Potain, with conjunctival hyperaemia and pain over the region of the frontal sinus. Duflocq drew special attention to the frequency of oculo-nasal discharges during the last pandemic. We have already seen that Ballin was struck with the prevalence of infective nasal catarrh in his infant asylum, and the outcome of the bacteriological researches has already been mentioned. The oculo-nasal catarrh, when pronounced, enters largely into the constitution of the influenzal facies above described. It seems particularly in endemic influenza that coryza is encountered, the same, however, not being absent in the epidemic and pandemic disease. It is scarcely necessary to further describe this syndrome, of which the two main characteristics are an aqueous discharge - sometimes purulent and very irritating - and nasal obstruction.

HAEMORRHAGES.

Epistaxis is of by no means uncommon occurrence during influenza, especially in the great epidemics. It was very common during the last pandemic; and in some cases the syndrome has suggested the existence of enteric fever. Comby often observed it in children. The haemorrhages are ordinarily benign, though sometimes lasting for hours or more. Barthélemy, concurrently with bleeding from the intestines, haematuria, metrorrhagia, apoplexy, and purpura. These cases not infrequently die from exhaustion. Holtz almost lost one of his patients, a man of 36 years, from the severity of the epistaxis at the invasion of the disease.

LARYNGITIS.

This is of very common occurrence, and has been described in great detail by numerous writers. The ordinary symptoms of the affection are present, altered tone of the voice, and sometimes aphonia. In some of the

more serious cases there may be observed the occurrence of alarming oedema of the glottis, with intense dyspnoea, laboured respiration, substernal pain, and sometimes agonising distress even when the expiration is comparatively easy. Cartaz and Moure describe ulcerations of the mucosa and of the vocal cords. Tissier reports a case of acute laryngitis in this disease. Here there was extreme dyspnoea, accompanied by quickening of respiration and retraction of the neck underneath the hyoid, as well as substernal pain, and also loss of the voice. The laryngoscope showed that the supper aspect of the vocal cords was slightly hyperaemic, the cords movable, and that the subglottic mucosa reddened and accompanied by tumefaction and narrowing of the passage. The patient made a satisfactory recovery in five days. In the case of predisposed children, influenza may be marked by attacks of laryngismus stridulus.

TRACHEO-BRONCHITIS.

The trachea and bronchi are usually invaded by the influenzal catarrhal process, the patient appearing to suffer from a severe cold, with râles, rhonchi, and sibilant sounds and thoracic and substernal pains. Particularly in the case of emphysematous subjects, there may be noted a dyspnoeic form of the disease, with respiratory distress, sharp and shallow breathing, difficulty in talking, and a feeling of suffocation. In most attacks of influenza cough is a distressing symptom. It is commonly frequent and prominent, sometimes paroxysmal from the beginning of the attack, almost always so at some period of its course. The spasmodic character of the cough in some of the older epidemics led to a confusion of diagnosis between influenza and whooping-cough. The cough is apt to be worse towards evening an d at night. In some cases it leads to vomiting, and by its violence and persistence gives rise to myalgia in the muscles of respiration and occasionally to hernia. It is at first dry and attended with a scanty mucous-serous expectoration; later the sputa become mucopurulent, and they are sometimes streaked or mingled with blood. Towards the close of the attack the cough becomes less urgent and loses its spasmodic character. In some of the epidemics cough has not been a prominent symptom, and cases may be encountered in most epidemics in which well-developed influenza ran its course with little or no cough. Various râles may be detected during the course of the attack as in ordinary acute bronchitis. The auscultatory signs are negative and râles are absent in other cases. The catarrh usually remains limited to the larger bronchi; when it invades the smaller tubes it constitutes capillary bronchitis - a very serious complication accompanied by threatening asphyxia, cyanosis, subcrepitant râles, etc. The epidemic of capillary bronchitis, which prevailed in Nantes in 1840, was probably of influenzal origin. Comby noted the presence of the pneumococcus in pure culture in all the sputa which he examined in hospital, but there were no streptococci to be found. In the case of a severely-affected female auscultation revealed an enormous number of moist râles, and amongst other things there

was a foetid diarrhoea suggestive of alimentary troubles. In 2 of his patients the abundant expectoration became purulent from the first day, presenting also a striking resemblance to that observed in advanced phthisis or bronchiectasis. At the autopsy of a woman of 68 years he was unable to discover any important lesion. Many of the cases had died of suffocative catarrh; and at 3 autopsies not the slightest sign of hepatisation could be found, there merely being observed ordinary bronchial inflammation manifested by redness, swelling, and muco-pus. It is a well-known fact that the respiratory embarrassment and spasmodic cough are not infrequently out of all proportion to the triviality of the bronchial lesions. The extraordinary mobility of the bronchitic determinations of influenza, insisted upon by Marrotte, would seem to justify the name of "creeping catarrh" devised by Chnaoubert to mark this singular condition. The same characteristic appertains, moreover, to influenzal congestion of the lung presently to be described. It is here convenient to note a symptom of extreme gravity which may arise suddenly, especially in aged individuals, in the course of influenza bronchitis of apparently ordinary severity. It goes by the name of bronchoplegia (originally applied by Graves) or paralysis of the bronchial tubes. It will be described later on. Woillez speaks of haemobronchitis, but it is difficult to separate it from pulmonary congestion.

PULMONARY CONGESTION.

In 1890, Ferrand described a peculiar condition of the lungs preceding the pulmonary complications of influenza, and comparable to atelectasis. Clinically, there is a diminution in the permeability of the parenchyma of the lung, with considerable attenuation of the vesicular sound relative but well-defined dulness on percussion, slight increase of vocal resonance, and relative increase of thoracic resonance. These signs disappear rapidly and are to Ferrand dependent upon disturbance of the nervous system. The congestion of the lungs in influenza may be either active or passive. The acute form may of haemopoietic aspect, the patient then raising non-aërated, dark or bright-red blood. This active congestion may be bilateral; sometimes it is central and accompanied by an intensity of dyspnoea inexplicable on auscultation. Soon it may extend to the cortical part of the organ, and there also give rise to prognostic errors. When oedema is associated with this congestive condition, one may discover, according to Huchard, very fine, widespread râles (above and below and throughout the lung) mucous or sanguinolent expectoration, indistinct breath sounds, and various râles. The outlook is usually unfavourable. Congestions and inflammations of the lungs have been described by Huchard from paralysis of the vagus nerve; such are very similar to the pulmonary accidents occasioned by incomplete experimental section of this nerve. In some cases there is generalised pleurodynia, with painful points under the breast and

clavicle, about the scapula and shoulder, in the neck and arms. The same are probably due to myodynia or neuralgia. Gaucher has often seen congestion of the pleura result in effusion of moderate amount. In certain cases this congestion has lasted with a remarkable tenacity, even after the disappearance of the fever and return of the appetite; he has also observed to develop, during nearly two months, a patch of pulmonary congestion, with fine râles and other clinical signs of the condition, in the right lung. According to Duflocq, the congestion of the lungs and pleura just mentioned, in the course of influenza or during the convalescence thereof, occurs in those already suffering from some pulmonary complaint; it is very insidious, and it is only on careful auscultation that we discover the small areas of crepitant râles, either in the axilla about the middle of the lung or at the level of the root of that organ. There is little expectoration, the breath sounds are indistinct, and a slight murmur is audible at the end of a deep inspiration. The cough is often paroxysmal, and perhaps accompanied by a sticky or sanguineous expectoration. Thoracic pain is present. The evolution of the disease is very irregular; one day it is the right base that is invaded, the following day the left base, and then perhaps it passes over to the other side again; in short, there are alternations of arrest and recrudescence. We shall later deal with such complications as lobar pneumonia, bronchopneumonia, and pleurisy. Ollivier has contributed several interesting observations on congestion of the lungs in the course of influenza - a congestion which can assume the most variable forms. It may simulate especially the syndrome described by Woillez, the pleuropulmonary congestion of Potain, and the thoracic hyperaemia of Dieulafoy and Grasset. But out author, in view of his numerous personal observations queries if the forms with prodromes which Woillez regards as uncommon are not merely influenzas on which acute congestion is engrafted. Regarding the grippal splenifications, classed by him as congestive processes, he is inclined to believe that the process is benign and capable of complete resolution. As a reliable indication of this form he mentions the presence of bloody streaks in the expectoration, and says that it pursues a bronchopneumonic course. In the several observations of Meunier of the affection in children, twice this complication assumed a special character, there being, as it were, two special infections. In Ollivier's cases there were ordinary congestive attacks and an absence of actual bronchopneumonic areas. There exists, finally, a bronchoplegic form - well understood since the studies of Huchard on the subject - which, according to Ollivier's observations, can succeed to a slight lesion of the order of pulmonary congestion. The pleuro-pulmonary congestion, described in 1886 by Dreyfus-Brissac, has been mentioned by Alison as possibly the cause of influenza and as sometimes complicating certain hepatic disorders. In this form we find firstly the ordinary symptoms of pleurisy (chills, fever, accelerated repiration, cough, pain in the side, etc.), and then bronchial breathing with dulness,

oegophony, and diminution of the vesicular murmur and of thoracic vibrations. There is no pleural effusion. Semmola describes the sudden occurrence of dyspnoea in a large number of his cases of influenza, accompanied by a sharp rise of temperature. This dyspnoea, abrupt in onset and resistant to medication, on auscultation is seen to be accompanied by numerous subcrepitant râles; the patients not infrequently die of asphyxia, and from a state of hyperacute congestion. The urine of these patients, injected into rabbits, causes the death of the animals in eight hours with intense dyspnoea; and the autopsy demonstrates that the dyspnoea and fatality were due to the action of toxins on the bulb at a time when convalescence seemed at hand.

CLINICAL COURSE.

The behaviour of influenza is exceedingly variable: indeed, it is just this which constitutes one of its prominent characteristics. Thus, when fever is absent - the apyretic form of Huchard - there may be disturbances on the part of the nervous system, more or less severe headache with confusion of ideas and a tendency to melancholia, various pains, and general asthenia. If the bulb be affected, there are attacks of fainting or syncope; lumbago and renal symptoms will point to a participation of the medulla. Pneumogastric infection may be manifested by a slowing of the pulse, various pulmonary congestions, etc., of slow and insidious onset. In the febrile form catarrhal symptoms are prominent. Sometimes, according to Doussain, fever exists alone without any apparent pathological process to account for it. In the so-called ambulatory influenza of Huchard the affection is protean and full of surprises - so much so, indeed, that forecasting the issue of the illness is a matter of no inconsiderable difficulty; by reason of the difficubility of the exciting germ, nearly all the organs suffer, with the liability to inflammatory attacks, the arterial hypotension then coinciding with nervous asthenia. If bronchitis ensues, it is oftentimes purulent from the onset and may be followed by various forms of congestion and pneumonia. The evolution and duration of the disease admits of no absolute rule. Herpes labialis is a pretty good critical sign, but one cannot say as much for heavy sweats and diarrhoea. Polyuria and uratic discharges are favourable, some patients recovering in the course of three or four days. The tendency to ralapses is well known. It is seldom possible to forecast the date of convalescence, though the return of appetite at the defervescence is significant. One not infrequently comes across patients who, several years after an attack of influenza, accuse it of having undermined their entire system and of having done irreparable damage to their health. The patient subject to a sevre attack of this disease is for a long time debilitated, disabled, particularly susceptible to atmospheric inclemencies, and incapable of prolonged mental or physical exertion. Post-influenzal asthenia is classical, and the term has been happily applied. Neurasthenia attacks these persons on account of the undoubted depressing effect of

the toxins upon the entire nervous system. Some remain dyspeptic for years, others suffer from a chronic catarrh. The affection is particularly unfavourable in its influence upon the subjects of phthisis, cardiac disease, arterio-sclerosis, gout, diabetes, etc. During the last pandemic Ferrand drew attention to the prevalence of severe neurasthenia in the case of most of the convalescents from this disease. It consisted of an overwhelming cerebrospinal neurosis of a very acute kind, rendering the subjects thereof incapable of following their ordinary avocations and to exert themselves. Sympathetic affection in this way sometimes gave rise to chronic gastrointestinal atony. Some of the patients were subject to abundant intermittent perspirations, these appearing to be the outcome of an actual vasomotor asthenia. Some suffered from obstinate neuralgias. The latter were observed in many regions contemporaneously,- the sciatic, for example, with localisations in the sacro-lumbar plexus; at other times the pain was felt at one spot only,- e.g., in the anterior occipital or the great auricular nerves. More often there was supraorbital neuralgia, which is, par excellence, a feature of convalescence and directly amenable during its periodical manifestations to the salts of quinine. Trigeminal neuralgia is not infrequently troublesome. More rarely intercostal, phrenic, crural, and testicular neuralgias are observed. Joffroy in 6 cases saw scapulo-humeral neuralgia with subsequent muscular atrophy. Many of the accidents here mentioned are really sequels of influenza, not omitting certain psychoses and particularly psychoasthenias, with marked mental depression and asthenia of extraordinary duration. It is not surprising to find that influenza constitutes in a marked degree an exciting agent of hysteria. Consequently, on account of the profound shock experienced by the nervous system, of the serious disturbance of nutrition, and of the debilitating influence of the influenzal toxins, the individual predisposition is played upon and hysteria declares itself when the nervous system is the place of least resistance in the economy of the individual. The influenzal psychoses will be fully discussed in the section on complications. The most interesting of the visceral asthenias is that of the heart. According to Huchard, the pulse exhibits a certain peculiarity which he designates the "pouls instable" or unstable pulse. The mere changing from the horizantal to the upright position is sufficient to cause a marked acceleration of the pulse; this symptom is the outcome of lowering of the arterial tension. There is a tendency to syncope in certain cases at any time. The same author classes with the diseases of arterial hypotension the typhoid form of influenza. At the climacteric period influenza has a very unfavourable influence, and in women at this time arrhythmia and fainting fits are not rarely observed. In the presence of such systemic debilitation as that which influenza produces, it is easy to understand the occurrence of loss of appetite and gastrointestinal disturbances, and also to recognise how easily and

rapidly malnutrition and emaciation may be produced. Huchard says that the patient may lose as much as twenty-four to thirty-four pounds in weight, and he places the duration of convalescence at three months.

CLINICAL FORMS.

In accordance with the localisation of the grippal manifestations in one or other of the various systems or organs, so have certain clinical forms of influenza been recognised, e.g., the thoracic, nervous, etc. Let us consider these in detail.

THORACIC FORM.

In this form of influenza the whole of the mucous membrane of the respiratory tract may be involved. The LARYNX has been said by some to be rarely affected, whereas others have affirmed quite the contrary. This striking variation in the frequency with which laryngeal implication has been noted by different observers is due sometimes to external causes. It can be readily understood that sufferers from influenza, in whom the pains in the head were the most prominent symptoms, or in whom the general manifestations of the disease were so severe as to overshadow in great measure the laryngeal complication, would not be found usually in a special institution for throat diseases or under the care of a specialist. In other cases the condition of the larynx is often overlooked, the implication of this part being only of slight severity in the vast majority of instances. There may be pure hyperaemia of the larynx or infiltration and swelling or infiltration of the tissues. With the hyperaemia belongs the haemorrhagic form of laryngitis which is amongst the most frequent of the affections of the larynx. During the last pandemic it was noted by numerous writers. Some of the latter mention that the redness of the laryngeal mucous membrane was more intense than is usual in simple acute laryngitis, whereas others dwell upon the occurrence of haemorrhagic inflammation with an intense redness of the arytenoids, the epiglottis, and the vocal cords, in general a very marked injection of the vessels, and not rarely a resultant bloody expectoration. These accidents are not, however, invariably observed. In some of the published cases the swelling of the mucous membrane involved the entire larynx, in others it was more circumscribed. Some have inclined to the opinion that the first form is more common than would be inferred from the reports in which it is specifically mentioned, believing that the angina and the hoarseness mentioned in the descriptions of some of the cases are due to swelling of the laryngeal mucous membrane. In all of his cases Fraenkel found a marked swelling of the latter tissue; he says that this sometimes presents a picture such as that described by Rauchfuss as pseudocroup, in which inspection shows three folds: first, the false vocal cords, then the vocal cords, and beneath these, chiefly anteriorly, a subglottic swelling which looks like another fold of mucous membrane. The arytenoid folds may be rendered indistinct by the marked swelling thereof, and the false vocal cords may be tumefied also. Circumscribed swelling of the individual parts has also

been described, and cases have been reported in which the interarytenoid region was the seat of a peculiar form of inflammation, this being a primary condition and occasioning a consecutive oedema of the glottis threatening the life of the patient. Herzog described the swelling in the interarytemoid space as laryngitis postica. This may lead to circumscribed or diffuse laryngeal or glottic oedema threatening life. Especially noteworthy are the published reports of Fraenkel, who found that the middle portions of the vocal cords, which were generally reddened, were of a dirty-white colour. He regarded this as characteristic of a fibrinous inflitration of the cords, which might be of value as pointing to the diagnosis of influenza. The formation of a crust, particularly in the posterior wall of the larynx and subglottic region, is also mentioned by him as peculiarly characteristic. The occurrence of ulceration affecting chiefly the anterior half of both vocal cords, of superficial nature and healing with the disappearance of the influenza, has also been reported. The muscular tissues are also invaded when the infiltration occurs in the deeper portions of the mucous membrane, in consequence of which arise paralysis and motor disturbances in the larynx. Indeed, it has been said that there is a form of the disease in which the primary seat is the muscular and submucous tissues causing marked motor disturbances, while on the mucous membrane only slight evidences of catarrhal lesions are to be seen. It is very probable that the frequently long-continued, possibly even permanent aphonia, or at least impaired voice formation, may be referable to a lesion of this character. One may conclude that a characteristic laryngeal symptom of influenza is an otherwise seldom observed hyperaemia and inflitration specially localised in the posterior portion of the organ. Many of the paralytic symptoms are undoubtedly of nervous origin and are not directly dependent upon the local lesions. The course of this affection of the larynx points also very clearly to the fact that, in most cases at least, the process is a deep-seated one; recovery is extraordinarily protracted, and the sequelae are often of a kind resembling closely those of some such acute general disease as diphtheria.

TRACHEA.- This may or may not inflame in conjunction with laryngitis and bronchitis. The latter is the usual accompaniment of tracheitis, but even when this is the case it is generally believed that the cause of the strong fits of coughing is seated chiefly in the trachea, especially at its bifurcation and in the primary bronchial trunks. The attacks of cough are often of exceeding severity and distress the patient day and night. Even in the earliest recorded epidemics special mention is made of the spasmodic character of the influenza cough. Its resemblance to pertussis was then also noted, as, too, its tendency to produce abortions.

BRONCHIAL TUBES.- Bronchitis is one of the commonest accompaniments of influenza, and it is then particularly apt to implicate only a part of the bronchial tubes, whereas under ordinary circumstances of origination

the whole of the bronchial tree may be affected. In the beginning the bronchial mucous membrane is simply hyperaemic. While the fever is rising and the attack of influenza is beginning there is frequently scarcely any evidence of secretion to be detected on careful examination. At other times, very early in the course of the disease, we find the physical signs of a tumefaction of the bronchial mucous membrane, as shown by a heightened murmur at certain points or by a loud inspiratory sound. It is not infrequently observed that the inspiratory murmur at certain points is at first very faint, and then suddenly becomes very loud. Oftentimes, however, we find severe cough and short breathing amounting at times at actual dyspnoea, at even an early stage of influenza. The bronchial affection is probably responsible for the many physical peculiarities noted in the examination of the chest. Thus, we find localised spots of atelectasis, slight dulness on percussion, and weakened respiratory murmur. It is seldom that this dry catarrh lasts for any great length of time, and usually a secretion from the mucous membrane occurs early, and then we find the physical signs of bronchial catarrh, together with an expectoration which is usually purulent from the outset. The sputa are often from the very beginning of an intense yellow colour, sometimes of a more or less greenish-yellow appearance. It seems doubtful whether the bloody stain, which is often seen in the sputa and which gives it a very peculiar flesh-coloured tint, is due to the bronchial inflmmation alone, or whether it does not imply that there is already an implication of the lung tissue in existence. Though the dry catarrh may last for some time, there are other cases in which the secretion increases progressively until it ends in an actual bronchorrhoea, the expectoration amounting to as much as a pint or more in the twenty-four hours. Examination of the chest shows then an exceeding variety in the character of the râles, so that almost every form of rhonchus may be heard. The sputa sometimes become nummular in shape. In the course of such an inflammation bronchial dilatation may occur early, and it would seem even as though this profound anatomical change might take place without any participation of the pulmonary tissue. This alteration may persist for quite a period, and may even pass into a deep-seated chronic affection having a most injurious influence upon both circulation and nutrition. A bronchial dilatation may sometimes be produced at isolated points. In such cases we find that for a long period there is an expectoration of sputum of a special appearance, perhaps once every day, after the discharge of which for a time there is no further expectoration until the sputum had again collected so as to fill the dilatation in the bronchial tube. One sometimes observes a notable symptom in the coughing up of fibrinous bronchial casts. The bronchial secretion soon becomes purulent in the presence of influenza bacilli, so that the rapidly occurring purulence of the expectoration in a case of acutely progressive bronchitis offers strong presumptive evidence that there is an influenzal infection. The presence of the influenza bacilli or the

streptococcus, however, alone will warrant a definite diagnosis of an infection by either organism. Very often the severe poisoning of the system gives rise to marked symptoms on the part of the nervous system or of the digestive organs, even when the local process in the bronchi is of limited extent. It is important to remember that the influenza bacilli may remain in the bronchial tubes beyond the time of the disease, far longer also than is generally supposed. Influenza occurs, moreover, with special frequency in cases of bronchitis having a different causation. One often sees patients who have had for along time cough due to an ordinary bronchial catarrh, subsequently acquiring an influenza. Usually this is regarded simply as an exaggeration of the already existing bronchitis. Chronic cases may act also as special sources of the infection, carrying the disease to healthy and other individuals, especially to those suffering from phthisis or bronchitis. Many of the bronchitic patients become worse during the winter from infection of their bronchial tubes with the bacillus influenzae, and in many of them there are symptoms of influenza present. Whether this is due to the fact that the patients have already harboured the influenza organism for a long time, or whether the symptoms are modified through the presence of the older infection, is difficult to determine. The term intermittent influenza may be coined for these cases, it being important to remember that in them the specific bacilli may disappear for a time from the sputum and appear therein later on.

INFLUENZA PNEUMONIA.- Inflammation of the lungs is one of the commonest accompaniments of the grippal attack. It is convenient to consider it under the two headings of pulmonary inflammation with bronchitis and pneumonia without the latter feature.

1. Bronchopneumonia.- Cases of bronchopneumonia due to the action of the bacillus influenzae may be of such a benign character that the diagnosis can be made certain only by the characteristic appearance of the sputum and the determination in it of Pfeiffer's bacillus. The patients are usually, but not always, taken ill with more or less severe chill, pains in the loins, back, and extremities, and almost without exception complain of severe headache. Some have severe pleuritic pain in one or the other side of the chest, and usually they present the picture of persons who are seriously ill, the rapid respirations and cyanosis pointing to the lungs as the chief seat of the malady. The pulse is frequent, the temperature is high, 104. F. or over, often with morning remissions; there is anorexia and commonly also constipation, but profuse diarrhoea is seldom or never noted. The changes in the lungs vary according to the length of time the patient has been ill, but are always characteristic. In no case, even in the early stages of uncomplicated influenza do we fail to find pronounced physical signs in the chest. In the very early stages of bronchopneumonia we usually find in the posterior inferior parts a dulness on percussion, with well-marked bronchial breathing, -which is in itself very characteristic, as if it were transmitted from a distance, -and

fine and coarse bubbling râles. In other cases the entire process is located at the apices and a physical examination reveals a picture more like that of tuberculous affection of the apex, but which disappears entirely after recovery from the primary disease. In other cases, again, the symptoms resemble those of a wandering pneumonia, the affection involving first the entire left lower lobe, for example, and then passing over to the right upper lobe while resolution is taking place in the lower lobe. Always, however, the same characteristic physical signs are present, namely, pronounced dulness on percussion over the affected portion, with distant bronchial breathing and various kinds of râles. In the stage of resolution the bronchial assumes gradually the character of vesicular breathing, and one hears more or less coarse bubbling râles. It is easy to understand the fact that the lung tissue becomes infected from the bronchi in influenza, and thus gives rise to bronchopneumonia, from what is known of the influenza bacillus; indeed, it is a cause for wonder that such extensive bronchial catarrh may often exist without leading to bronchopneumonia, especially as the secretion within the tubes is profuse, thin, and frankly purulent. True bronchopneumonia is the most frequent pulmonary affection in influenza, and it has been shown that in such cases the grippal process invades the lungs from the bronchi. Preparations clearly show that the ciliated epithelium in the larger branches is destroyed, and that the epithelial shreds are found lying in the lumen of the bronchus, and that in other places the epithelium seems raised up by pus cells formed beneath it. The pus cells force their way in little masses between the cylindrical cells, even when the epithelial coat is apparently intact, fill the defects caused by the loss of ciliated epithelium, and cover in a more or less thick layer the free surface of the mucous membrane. The peribronchial connective tissue contains many wandering cells. Similar changes occur also in the small bronchioles, the lumen of which is usually completely filled with mucin and pus corpuscles. We find influenza bacilli in enormous numbers in the bronchi, on the epithelium, and between its cells, and also beneath this layer. It is supposed that the wandering cells come to the free surface of the bronchial mucous membrane and there load themselves with influenza bacilli, producing the characteristic mucopurulent secretion of influenza bronchitis. The entire process therefore appears in the guise of a catarrhal suppuration in the hightest degree. The course of the inflammation is a progressive one, from the nose and larynx downwards, extending by continuity to the lung tissue. In this circumstance we find a satisfactory explanation of influenza pneumonia. Each area of infiltration is to be looked upon as in relation with a diseased bronchus through which the infectious agent has gained access to the substance of the lung. The origin of the pulmonary inflammation is explained on the ground that the preliminary process takes place in the air passages, especially in the bronchi, the inflammation then invading the lung. Pure and uncomplicated influenza pneumonia is a true broncho-

pneumonia accompanied by a suppurative process. Indeed, it is well known that a bronchitis frequently ends in a pneumonia. During the last pandemic there were a remarkably large number of cases of bronchopneumonia observed. The affection of the bronchial mucous membrane belongs, almost without exception, to the catarrhal form of influenza; the consecutive infection is in many cases fibrinous, in others cellular, in other, again, a bronchopneumonia with more or less catarrhal exudation. During an epidemic this form of bronchopneumonia is encountered, sometimes in large numbers, sometimes only in isolated instances. During the last pandemic it was so common as to be termed influenza pneumonia, these cases differing in no essential from those previously observed. It is extremely contagious. The physical signs of the condition are such well-known phenomena as dulness. In the examination of a severe case of influenza, the signs of bronchial involvement often stand out very markedly. The question is now when, in such cases, can we determine from the physical signs that a pneumonia has supervened. The areas of dulness which are discoverable in the lungs of such a patient are seldom very pronounced unless they have existed for some time. These areas are in most cases quite numerous; they are not sharply defined, but the dulness shades off indistinctly into vesicular resonance. They do not usually occupy an entire lobe, and their favourite seat appears to be the borders of the lung; many writers say that they bave found them more frequently in the left lung than in the right, while others affirm that the apices are most often involved. Perhaps these areas of dulness are in part an indication of patches of atelectasis, which may readily arise from the plugging of individual bronchial tubes, but which are in the vast majority of instances excited by an inflammation of the part. The alteration of the respiratory murmur is another important physical sign of influenza pneumonia. Bronchial breathing is usually neither so frequent nor so regular as some have affirmed. There are many places where dulness has been found in which the respiratory sounds are very weak or cannot be heard at all. When the breathing is bronchial it has the character mentioned above of coming from a distance. The absence or diminution of respiratory sounds in the area of dulness can be readily understood when we consider that the bronchi leading to the parts may be occluded either by swelling or by the profuse expectoration. Pure bronchial breathing, such as is heard in croupous pneumonia, is very uncommon, and this is a consequence of the nature of the inflammatory process. Marked bronchophony is a valuable symptom in enabling us to determine the existence of infiltration in an area of dulness, even when the latter is exceedingly slight. Unfortunately, however, when the larynx is involved the sign is not elicited owing to the feebleness of the voice. Crepitation is a homogeneous sound which stands in relation to the vesicles of the lung. It gives the impression of being caused by the bursting of an infinite number of air bubbles of uniform size; its existence is said to presuppose fluid in the bronchi and pulmonary vesicles, which, moved by the penetrating

inspiratory current of air, that naturally must be sufficiently strong, gives rise to the sound. It has also been regarded as pathognomonic of pneumonia in the first stage, and on the basis of this assumption has been called the râle inflammatory crepitation. This pathognomonic significance was, however, opposed by various observers, so that for a long time it was sought to explain the production of this crepitation in another way, either through the presence os an exudation in the tissues, or as caused by ordinary adhesions of the walls of the alveoli or smallest bronchi and their tearing apart upon inspiration. Wintrich offered, and proved experimentally, a very ingenious explanation of the production of this sound. He declared that crepitation is simply the murmur caused by the sudden tearing apart of the mucus of the adherent walls of the smaller bronchi and alveoli by the inrushing current of air. Normally the lungs cannot contract to such a degree that the alveoli and fine bronchi adhere to each other. Therefore, in a healthy condition of the lungs true crepitation can never arise. If, however, the mucous membrane of the alveoli and finest bronchi is swollen and covered with a tenacious pneumonic exudate, then during expiration such an approximation of these that an adhesion takes place is easily conceivable. If a sudden strong inspiratory current o f air sweeps into the lung during the dilatation of the alveoli and finest bronchi, then in a likewise easily conceivable manner would these adherent regions be torn apart during rapid expiration, and cause the sound. He declares that the crepitation in various individuals may assume a varying intensity, and also that the strongest expectoration and the most intense coughing have absolutely no effect upon the crepitation, inasmuch as a sufficient swelling of the mucous membrane and a covering of this with tenacious mucus is all that is necessary for the production of crepitus. Such a mucous membrane can never have its swelling abolished by coughing. Similarly it appears by no means difficult to explain this crepitant râle as audible in the posterior regions of the lungs in other conditions than pneumonia; for example, in convalescence from typhoid fever and other severe affections during which the patients have remained upon the back in quiet respiration for a long time. It is to be remembered, however, that this non-inflammatory crepitant râle disappears after a few deep respirations. Our author says that this sound in the beginning and in the resolving stages of pneumonia is louder and more intense than he has ever heard it in oedema of the lungs, or in capillary inflammation of the bronchial tubes with the exception of a few cases. Crepitation is also audible occasionally in emphysema. The fine râle which is called subcrepitant is due to the presence of fluid in the smaller bronchi. While, therefore, crepitation is not a pathognomonic sign of pneumonia, it is at any rate very prominently found in this condition, and it may be taken as corroborative of a pneumonia, when the causes of oedema of the lungs in an existing emphysema and collapse of the lungs, such as may exist in convalescence, are excluded. It is differentiated from the crepitation of capillary bronchitis in

that it is limited to certain regions, and there are no bronchitic symptoms in other parts of the lungs. It is of secondary importance whether we look upon the crepitation as simply and solely originating in the vesicles of an area of the lung, or whether we regard it as originating in the bronchioles of a limited part of these organs. The general clinical course of not a few of the mildest cases of influenza pneumonia suggests that in the morbid process there had been but a small, in fact incidental localisation in the alveoli; just as in other cases a mild affection of the nasal mucous membrane produces secondary symptoms. If at the same time fever exists, which in some cases reached over 104. F., then this does not necessarily correspond to spreading of the pneumonic process, but belongs to the simultaneously existing influenza. A remarkable feature of these cases is the extraordinarily small and frequent pulse. The repeated slight chills and sweat indicate the influenza infection which, also in cases in which no pulmonary symptoms exist, present these uniform frequent alternations between heat and cold. Recurrences of a pneumonic affection are not responsible for the chills, as the latter follow one another far too frequently for that. The character of the temperature curve is one of the important signs of the existence of influenza pneumonia. In all, even in fatal cases, no very high temperature is observed. It ranges between 101. and 104. F., but for the most part is below the latter figure; consequently the disease bears a close resemblance to other grave infections, which, as in diphtheria, may lead to death without a high temperature. There is no definite fever type, and especially no relation between the height of the fever and the gravity and extent of the local process. Even the extension of the inflammatory process is not always accompanied by an elevation of temperature. A genuine initial chill does not belong to the fever of a grippal pneumonia. If this begins at a time when the influenza symptoms are in full play, then we simply find the repeated chills and perspirations of that disease. If it arises later in the course of the affection or during convalescence, then we usually observe that it is not ushered in by chill. Dyspnoea is a symptom which is much more apt to attract attention to the pulmonary process. One not infrequently notices that, even without any actual increase in the rate of respiration, a great air-hunger exists; but there is no constant relation between the number of respirations and the degree of dyspnoea. Cyanosis rapidly increases towards the end of life, so that in the dyspnoea, the cyanosis and the cold sweat a representation of collapse appears. The symptoms on the side of the heart, which show themselves in the frequency and the weak character of the pulse, are not caused by demonstrable disease of the cardiac muscle, nor is it endocarditis or pericarditis which overburdens the heart; but we can only account for it by the fact that some poison exists which affects the respiratory centre or that of the heart. The sputum is rarely of the character seen in croupous pneumonia, unless, of course the latter affection actually coexists. It may be rich

or mucopurulent. It is seldom raised in large quantities; it has, both during the height of the pneumonic process and for a long time during convalescence, a yellowish or yellowish-green colour and a tenacious mucous character, so that very frequently it is expectorated with great difficulty by the patient. In the sputum at the height of the disease the influenza bacilli are to be found sometimes in large numbers in pure culture, very frequently in the interior of the pus cells. They can be found in the expectoration for a long time during convalescence, in fact, long after, when the subject of the disease feels quite well, and finally suddenly take their departure. The pneumococcus is not usually found in such pure bronchopneumonic sputum, nor are rusty sputa observed. Streptococci are absent also in such cases. Consequently, it is believed by many that such a pneumonia, which is of frequent occurrence during an epidemic of influenza, is not another complication of the latter disease, but an ordinary extension of one and the same process from the bronchi to the pulmonary tissue. For that reason the bronchopneumonia of influenza stands out as an independent form of the disease, a form which particularly has nothing in common with croupous pneumonia, and is not produced, as in the latter case, by the diplococcus of that disease. This point has been specially emphasised by certain writers. The sputum is never, as noted, rusty, but always frothy and purulent; the fever type is irregular, and defervescence always takes place by lysis. Compared with croupous pneumonia, there is an extraordinary delay in resolution, and this form of the disease is most frequent in influenza, lobar pneumonic inflammation being comparatively rare. It seems established that this bronchopneumonic form of inflammation of the lungs, which is caused by the bacillus influenzae, alone may be observed. The various differences of opinion which existed prior to the discovery of the specific micro-organism depend in part upon the fact that in the occurrence of bronchopneumonia a new symptom has been encountered. Since we have suddenly found ourselves faced with a new disease in the occurrence of the catarrhal bronchopneumonia of influenza, an affection which, up to the last pandemic, we had always regarded as always secondary, occurring in measles, diphtheria, whooping-cough, rickets, or in the later stages of typhoid fever, and then practically only in children, the aged, and the debilitated. With the appearance of influenza, however, bronchopneumonia suddenly began to be encountered as a primary acute disease attacking the young and strong and those who had previously been in good health. Croupous pneumonia has prior to this epoch been regarded as the only form of inflammation of the lungs that could occur in this disease. The finding of Pfeiffer's bacillus in the sputum proves otherwise.

2. Pure Pneumonia.- Influenza may be accompanied by inflammation of the lungs without bronchitis. In addition to the general symptoms of influenza, we find consolidated areas in the lung without abundant crepitation, -perhaps an entire lobe being involved, -without a suggestion of fluid râles or tenacious mucous sounds

indicating a participation of the bronchial tubes in the inflammatory process. Such cases are recognised by the diminished resonance on percussion and the presence of crepitant râles, sometimes by the presence of the latter sounds alone. This symptom is to be regarded as the initiation of a pneumonia; for if the process does not come to a standstill, then we can observe gradually the advance of the symptoms from a beginning slight crepitant area to all the signs of a severe pneumonic process. This condition can only be confounded with an atelectasis, which in adults, in the absence of bronchitis or even at times of cough, can actually be excluded. The same crepitant râles as is heard in the first stage of development of lobar pneumonia is here to be made out. In the course of influenza one frequently finds catarrh of the bronchi and bronchioles, which, in fact, remains limited to a very small area or often enough to one lobe of the lung. These, however, do not cause crepitant râles, even if very small and for the most part sibilant and sonorous râles. One never sees, in the course of influenza or at any other time, a bronchitis commencing with this fine crepitant râle, and so it is admissible to refer the origination of the crepitation to the alveoli and in assigning a pneumonic element to these fine crepitating areas. It is probable that not a few of these cases are overlooked in practice, as they not infrequently run their course, from beginning to end, without a suggestion of expectoration and with very little or no cough at all. The localisation of the crepitation, the dulness, and the more or less altered breathing in the circumscribed areas of the lungs, at the same time the existence of the normal condition of the bronchi, which do not usually show the slightest sign of a diseased mucous membrane, imparts to these cases a definite type. Nevertheless, it is very striking to observe how rapidly the various areas of the lungs change, how the crepitation may disappear from out of reach of the ear and then be heard again. Many of the cases one comes across in practice demonstrate most clearly the commencement of the disease in the alveoli or their immediate neighbourhood without any bronchitic complication; and they also illustrate the fact that grippal pneumonia does not lead rapidly to the development of considerable areas at the originally affected regions, without assuming very clearly the guise of a wandering pneumonia. When we come to analyse the symptoms in these cases it must be allowed that the first changes may at times occur in the pulmonary tissue itself, without a previous affection of the nose or larynx. Even though these cases are far less frequent than those in which the bronchi are affected before the lung, it is still true that they do occur. This is evident from the fact that the first crepitation is extraordinarly fine in character, such as is usual at the beginning of a fibrinous pneumonia or of those forms of streptococcus pneumonia which run their course without participation of the bronchi. It may also be advanced in support of this contention that in such cases no sputum appears at the beginning, and only when

resolution is commencing do we find purulent expectoration; furthermore, there may be neither sputum nor bronchitic râles prior to the completion of resolution. In cases of influenza in which from the beginning nervous or gastric symptoms have existed, and in which usually bronchitis has not developed, such changes in the lungs may also appear. Thus, one often sees influenza patients take ill with pneumonia in whom no bronchitis of any account existed, bronchitis not necessarily being a forerunner of the croupous pneumonia which so frequently complicates this disease. Some writers have specially emphasised the fact that each division of the respiratory apparatus may be primarily diseased, without other parts being implicated in the process. Frequently there is an isolated nasopharyngeal catarrh, though the larynx alone may be more or less severely diseased. The cases in which, either alone or pre-eminently, the trachea and principal bronchi are attacked, present now and then convulsive attacks of coughing analogous to what is observed in pertussis, with loud bellowing paroxysms, which sometimes resemble suffocative fits. However, the bronchi, bronchioles, and alveoli may also be primarily diseased without catarrhal symptoms on the part of the regions higher up in the respiratory tract. There exists in particular also a very acute primary influenza pneumonia, i.e., an influenza which at once occurs with the symptoms of inflammation of the lungs. Even though in the majority of cases of influenza pneumonia the bronchitic affection precedes, and from here the inflammatory process advances to the lung tissue, still clinical observation shows that that form may be developed without any sign of bronchitis as a direct result of infection. Nevertheless, it cannot be denied that in the presence of this kind of symptomatology the possibility of the participation of the bronchial mucous membrane always exists. Firstly, it is possible that a dry inflammation of the mucous membrane was present in the bronchi, which did not declare itself either through secretion or bronchitic râles; secondly, it also occurs that marked changes develop in the bronchi, that in fact purulent secretion forms there without producing any symptoms during life. Although it may be that the first seat of the disease has its location in the bronchi more frequently than the clinical examination shows, there still remain cases in which, as a matter of fact, the bronchi remain free. The fact has been established that special changes in the bronchial mucous membrane are found almost absolutely. Some have mentioned as common to all cases a redness, of varying intensity in the mucous membrane of the larger bronchial tubes, the trachea, and the larynx in many cases; in some cases this infection is very slight, the mucous membrane being covered with a mucus of a yellowish-green or grayish colour and marked tenacity. Histologically, the finest bronchi in the centre of the cellular infiltrated pulmonary tissue may remain entirely free, this serving to confirm the fact that the tissue of the lung may, as a result of the influenza infection, pass through primary inflammatory cellular changes without interposition of a bronchial suppuration.

This condition merits emphasis for the reason that, if we expect only the bronchopneumonia in influenza, then these primary cellular inflammations of the lungs will be overlooked in the beginning. Slight areas of consolidation, which betray themselves by crepitation, occur in one or other part of the lung with extraordinary frequency, and they may very easily be overlooked upon superficial examination. From this, however, there develops often in a remarkably short time a diffuse pneumonia, which could perhaps have been prevented had the danger been recognised in time; in this way many of the patients who have contracted pneumonic inflammation in convalescence or at some other time could possibly have been saved. In the diagnosis of indistinct primary areas of consolidation in the lungs, the occurrence of bronchophony is of service. Although all such symptoms as fever, tachypnoea, tachycardia, etc., may show the onset of an influenza pneumonia, at times it is impossible for many days to demonstrate the seat of the inflammatory area. Far more frequently, however, it is possible, after examinations which are undertaken daily and which are painstakingly effected, to find here and there, generally bilaterally, here in the lower, there in the upper lobe, in the axillary line, or particularly often at the lower edge of the scapula, an area varying from a florin to the palm of the hand in size, which, marked by a relative dulness, present numerous fine crepitations, bronchial breathing, and bronchophony.

PLEURISY.- The pleurisy observed in influenza may be of a dry kind. Morel-Lavallée describes subacute diffuse pleuro-cellulitis in the course of dry pleurisy of influenzal origin. He insists upon the extraordinary variability and on the polymorphism of the auscultatory phenomena of grippal pleuritic inflammation. Gaillard reports 3 cases of unilateral dry pleurisy of similar origin. The first-mentioned author, dealing with the salient features of his cases, mentions a number of symptoms of a special character. The pains, fixed or radiating, have a neuralgic character; there is pleuritic friction and unmistakeable crepitation. These sounds seem to pass, as it were, out of the pleural cavity and into the subjacent cellular tissue, becoming extra-pleural. This unilateral dry pleurisy has been reported by Châtellier and Brocard, and Bloch in 450 cases of epidemic influenza, sometimes occurring at the eighth day with the decline of the fever. In certain epidemics pleurodynias and thoracic stitches seem to have been very frequently observed. Laurent mentions the occurrence of Bilateral dry pleurisy as an essential symptom. In his well-known work based on numerous observations, he speaks of characteristic pleuritic frictions, the sounds being very superficial, irregular, rough, unequal, and seeming to accompany the movements of ascension and descent of the thorax; they were sometimes, according to him, of a very fine character. It is noteworthy that the the pulmonary parenchyma is quite unaffected. Amidst the secondary characteristics our author mentions the insidious onset of the disease, the bilateral nature of the friction, the hoarseness of the voice almost amounting

to aphonia, and sometimes a dry and capricious cough. The temperature remains normal, and the general condition is always satisfactory. The drug, according to him, par excellence, is salicylate of soda; and he thinks that judicious gymnastics, massage of the thorax, fencing, swimming, and dumb-bells will oppose the formation of adhesions with subsequent union. There are, according to Brocard, three principal ways in which grippal pleurisy may occur; first, it may be at the onset either acute with pain, fever, etc., or insidious, or it may be dry, serofibrinous, or purulent; second, it may coexist with other bronchopulmonary manifestations, such as pulmonary congestion; or, third, it may supervene after a lobar or bronchopneumonia. According to Bucquoy, the serofibrinous effusions are for the most part benign; they are usually moderate in amount, though sometimes so considerable as to seriously threaten the life of the patient. Transitory pleural effusions are not infrequently observed consecutive to acute congestion of the lungs. The specific bacillus has been found by various observers in the liquid, and in septic cases other pyogenic germs have been isolated. In a case in which the bacteriological examinations seemed to be negative, Meunier found serofibrinous pleurisy on both sides with a considerable pseudo-membranous exudate, but no liquid. Purulent pleurisy in pneumonic cases is usually produced by the pneumococcus or the streptococcus, sometimes by both together, the bacillus influenzae seldom being observed in the effusion. Other organisms may also participate in the morbid process. Jarre mentions 5 cases of purulent pleurisy, with 4 empyemas treated by Rendu, Robin, Hanot and Letulle. Surgical intervention, in fact, in these cases of abundant and insidious effusion gives the best results. Laveran described 6-cases of purulent pleurisy, of which 3 coexisted with pneumonia. Some of these cases were observed in persons under treatment for other affections. Operation was performed on 4 of the patients. Death occurred in 2, in one of them the affection coinciding with pneumothorax and with generalised septic peritonitis in the other. In one of the successful cases the purulent liquid contained enormous numbers of streptococci. In another case of influenza in the same institution, with pleural effusion, endocarditis, pericarditis, and peritonitis, Vaillard and Vincent encountered in the blood of the cephalic vein, examined two hours after death, the streptococcus also, this organism alone existing in the pleural liquid. From the result of his observations during the last pandemic, Netter denied that the pneumococcus can produce the complications of influenza usually observed. That organism and the streptococcus normally exist in the buccal cavity of healthy individuals, being doubtless capable of acquiring a very special virulence in the course of influenza and engendering secondary affections. It is a noteworhty fact that the pneumococcus has been comparatively rarely observed in the contents of grippal empyemas. In the case of the latter the pus is creamy, thick, and not large in amount; resolution is common and recovery occurs. All other cases are usually the work of the streptococcus;

in this form of pleurisy the temperature is very high, pleuritic pain severe, and a dirty-gray pus forms almost immediately after puncture, even after the operation for empyema. The encapsulated bacillus of Friedlander may also, but very rarely, give rise to pleural suppuration. This organism was found in pure culture in one of Letulle's cases; the patient had a very abundant purulent expectoration, and in the course of fifteen days the purulent character left the sputa and the patient made a good recovery in due course. Crespin has published a very interesting case in which the patient, after suffering severely from influenza, had considerable chills, abundant perspiration, with the expectoration of a dirty-grey material having a foetid odour. The grippal bronchitis appears to have been followed by gangrene of the lung with perforation of the pleural membrane. Pleurotomy, followed by irrigation of the pleura first with hot water and afterwards with boric solution, was completely successful. The bacteriological examination of the sputum revealed merely the ordinary bacteria of the mouth. The pleural effusion contained the staphylococcus, the streptococcus, and the leptothrix buccalis. The last-mentioned organism may, though rarely, perform an active part in the production of pulmonary gangrene. Dopter and Tanton have published the results of their cytological examinations of the serofibrinous effusions in pleurisy. In 60 of these cases there were five diagnosed as of grippal origin. In 2 of them not accompanied by pulmonary manifestations the culture remained sterile, and the cytological formula was identical with that of pleurisy a frigore, there being an undoubted predominence of lymphocytes with a small number of polynuclear eosinophiles. In 3 other cases occurring in the convalescence of influenza the formula was the same.

GASTRO-INTESTINAL FORM.

This form of the disease is usually only in evidence when the respiratory disturbances are comparatively trivial in their character. The clinical phenomena are in the main of a functional character, grave lesions being present only in a few cases. In the case of a gastric location of the symptoms, the picture of the disease is more or less that of an acute indigestion. Most frequently the tongue is heavily coated, there is an unpleasant taste in the mouth, the breath is foul, there is tenderness on pressure in the epigastrium, anorexia occasionally occurs, vomiting may be noted, and the action of the bowels becomes irregular. Either constipation or diarrhoea may occur. All these symptoms may be observed together, so that it is not easy to tell which part of the digestive tract suffers most, though the primary disease is suggested by the general clinical course of the influenzal attack. These symptoms therefore merit consideration in detail. The vast majority of the patients have loss of appetite. This anorexia is not infrequently of long duration, while many different influenzal localisations run their course. It often lasts far into the convalescence, and then greatly hampers recovery. It is frequently combined with a bad taste in the mouth,

which is often so pronounced that many of the cases complain of it without questioning. Some of them are unable to smell, and often also to taste; others complain of an insipid, bitter, foul, or salty taste in the mouth. It is quite common to observe a loathing for any kind of food. In addition to all this, the tongue is usually heavily coated. As already mentioned, some authors have attached a considerable diagnostic importance to this coating, but I am unable to agree with them in assigning a pathognomonic interpretation to it. It is said to grayish-white, striped-red, bluish-red, fuliginous, etc. Other observers dwell upon an intense redness of the whole tongue as indicative of an inflammatory change, glossitis. The changes of the mouth and mucous membranes of the mouth and pharynx have already been considered. The mottled appearance of the tongue is mentioned in some of the earlier works on the disease. Stomatitis simplex, vesiculosa, ulcerosa, were names given to various forms of inflammation of the oral mucous membrane. Haemorrhagic angina, haemorrhages from the gums, the back of the tongue, and the pharynx have also been described. Other writers draw attention to tonsillitis and angina erythematosa as more or less frequent symptoms of this disease, and as explaining the perversions of taste, anorexia, etc. Vomiting is a very common symptom in this form if influenza. It may be especially violent, at times intractable and lasting for days; in children it may be the only symptom. More severe symptoms, as haemorrhages from the stomach, may be encountered, but not so frequently as others; peritonitis and enteritis may be accompaniments. Grave ulcerative or haemorrhagic disease of the mucous membrane has been reported by Jürgens, who observed at the autopsies of his cases broad, but not deep, ulcers, sometimes several centimetres in length, in the gastric mucosa; the latter, and in part the submucosa, were also oedematous and the seat of a cellular infiltration as if a phlegmonous gastritis were commencing. In only a comparatively few cases have such grave changes been observed by others. In not a few of the cases diarrhoea occurs, and not infrequently without there being any other manifestation of intestinal or other trouble. Variations are, however, observed in this respect in different epidemics. It may be an accompaniment of the vomiting, and sometimes the patient thus comes to suffer from a severe gastrointestinal form of the disease, the same perhaps simulating cholera, the patient nevertheless recovering. The literature contains numerous instances of this. In some of the reports of the last epidemic it was stated that alarming intestinal symptoms were frequently observed. The grave gastric forms were often preceded by attacks of cholera nostras, particularly in upper Bavaria, or dysenteric stools made their appearance, and even profuse, but ephemeral intestinal haemorrhages were noted. From other parts of the continent we learn that the gastric form alone occurred probably the most rarely of all, and mainly attacked children; even then it was a prominent form of the disease in only two circumscribed regions. As a rule, anorexia, nausea, disgust for food, vomiting, and dyspepsia were the

symptoms in the gastric form; stubborn intestinal catarrh, constipation of diarrhoea, and attacks of colic in the enteric rorm. Occasionally a catarrh of the large intestine with bloody stools and haemorrhage from the rectum occurs. It has also been noted that the gastric form has sometimes mainly affected children and women, and then, as a rule, under the form of gastrointestinal catarrh. In a number of cases grave choleraic symptoms develop, and may even be complicated with cramps in the calves of the legs. In other cases severe involvement of the intestines may be manifested under the picture of perityphlitis and peritonitis, accompanied by an obstinate hiccough. In certain epidemics the involvement of the stomach and intestinal canal has been of frequent occurrence, and occasionally the affections of the digestive tract have amounted to important complication and have led to sequelae which materially prolonged the convalescence of the patients. The other symptoms of influenza have not infrequently been preceded by those of an acute gastrointestinal catarrh; and in not a few instances the picture of severe cholera has been simulated by the abruptness of the onset, the violent vomiting, the cramps of the muscles of the legs and arms and back, the repeated watery diarrhoea, and the cyanosis of the face. Anorexia, almost amounting to a positive loathing for food, may be the most prominent symptom in the cases in which there are urgent symptoms in the digestive tract. The bowels are less often the subject of constipation than of diarrhoea. Not infrequently constipation is present from the beginning to the end of the illness; in other cases the alternation of diarrhoea with constipation may be especially prominent. Many of these cases of constipation can probably be explained without the presence of grave intestinal lesions; but there exists also a graver form of constipation, which is caused by severe enteritis due to circulatory disturbances in the intestinal walls, which lead to paresis of the bowel and meteorism. Intestinal obstruction may be suggested by the severity of the symptoms and the picture of a general peritonitis, as manifested by the great tenderness of of the abdomen, the violent vomiting, and the collapsed condition of the patient. Under the action of the specific bacillus of this disease, it is noteworthy that in certain cases portions of the intestine become affected in a special manner. The lower portion of the ileum and the caecum become involved in a localisation of a grippal enteritis with great pain in the vicinity of the caecum, so that the picture of an appendicitis is presented. These cases have been described as typhlitis caused by influenza by Teissier, and Leichtenstern believes that we here have to do with a true inflammation of the caecum without appendicitis. He observed during the pandemic of 1889-90 a few cases in which influenza and typhlitis were present at the same time, but he did not at that time look upon the two as having a direct casual relation to each other; he believed it to be a coincidence of influenza complicated with an ordinary appendicitis. The influenza nature of the latter was afterwards brought home to him. It may here also be noted that some writers recognise a typhoid form of influenza, in which typhoid fever is pretty accurately simulated by diarrhoea, abdominal distension, catarrhal symptoms in the

caecum, and nervous disturbances, the latter increasing from simple somnolence to a state of coma or of meningeal congestion. This likeness is still further increased if the tongue becomes dry, and if there is a rash which is either really roseola, or at least very much like that. The enlargement of the spleen present may still further increase the difficulty of diagnosis. Nevertheless, in most cases influenza begins more abruptly than typhoid fever, and the former affection is ushered in by a chill which the latter disease is not; furthermore, the course of disease in typhoid fever is altogether different to that of influenza, and the temperature curve especially will lead to a proper recognition of the existing disease. The stomach and bowel symptoms may be observed not only at the height of the disease, but after its subsidence, i.e., as sequels of the attack. In that case the loss of appetite and accompanying gastric troubles may last for weeks after the decline of the influenza, so that the patient may markedly emaciate and even develop a true cachexia, with the result perhaps that he is suspected to be suffering from cancer or some other chronic affection of the stomach. These grave cachexias, however, with marked loss of flesh, are also often observed in those in whom there are only very insignificant anatomical changes in the stomach and intestines. The patient very often loses much weight, and in certain epidemics this symptom is very constant. This is not entirely due to the gastric and intestinal changes, as it may be observed when the brunt of the disease falls on the lungs or elsewhere. It is a remarkable fact that the gastric form of the disease does not always accompany the nervous and catarrhal form. Thus, more nervous and catarrhal cases may be observed in the beginning of an epidemic, and only later the gastric forms increase. In other outbreaks of influenza, the catarrhal cases, which are at first perhaps more frequent, give way in the second half of the epidemic to the nervous forms; in other places, again, the neuralgic form prevails in the beginning of the epidemic, then comes the catarrhal, and lastly the gastric form. Furthermore, in certain localities there may be more trivial cases, whereas in others the grave and complicated forms may prevail.

NERVOUS FORM.

When the brunt of the influenzal attack falls on the central nervous system or the peripheral nerves we recognise the nervous form of the disease, the respiratory and gastrointestinal symptoms having a secondary importance. Indeed, there are very few cases of influenza which do not show some sort of disturbance on the part of the nervous system, and this fact is well borne out by statistics and everyday experience of the disease. Furthermore, there is hardly a nervous symptom which is at some time or other not encountered in this affection, so that a full account of the nervous disturbances of the malady would occupy a considerable treatise and deal with practically every organ and tissue in the body. This is, of course, beyond the purpose of this essay, but the clinical importance of the subject demands that the more common and better known of the nervous accidents of the disease should have due consideration. In the

first place, it may be noted that headache is a symptom of influenza that is seldom or never absent, it being sometimes located in the front of the head but more often all over it. The phenomenon may be after the nature of a pressure or of a general hyperaesthetic condition of the scalp. In the latter case it frequently extends to the face, the ears, and the throat, and is combined at times even with a general hyperaesthesia of the whole body. In the greatest number of cases, the headache has its seat in the neighbourhood of the forehead, over the eyes, extending from her into the depths of the orbits, and then frequently reaching such a degree as greatly to depress the patient or excite him to constant restlessness, or even drive him nearly mad with its extraordinary severity. So it comes that one may be led to diagnose the existence of a meningitis, particularly as a true clouding of the sensorium is occasionally produced by the violence of the pain, its duration, and the insomnia which is caused by it, as occurs at times in grave organic disease of the cerebrum. As the influenza comprises other parts of the nervous system besides the brain, even the strongest persons lose control of themselves perhaps under the influence of the agonising pains, the headache not being peculiar to weak and debilitated individuals. The paroxysms of pain complained of in the back and sacral region, radiating to the muscles, the joints, the thorax, and the limbs, may be just as painful as the cephalalgia, although not quite so violent in their appearance. These pains sometimes are so severe that the patient is unable to lie in bed quietly, and his strength is exhausted by the disturbance of sleep occasioned by general restlessness. In many cases they are complained of in the beginning of the disease, and the sacral pains have been known to simulate prodromata in the time of their occurrence. At any time during the attack pain may be localised in certain nerve areas, few or no nerves escaping this neuralgic condition in one or other case. Trigeminal, occipital, cervicobrachial, and intercostal neuralgias have been observed with especial frequency, and have been particularly conspicuous for their intensity, partly for the peculiarity of their temporary or periodic appearance. In these neuralgias the visceral forms are to be included, violent pain in the stomach, in the course of the intestines, in the neighbourhood of the bladder and of the diaphragm, and in the sternum for instance. Thus, some patients particularly complain of severe neuralgia in the course of the nerves of the forearm and shoulder, the existence of a neuritis being shown perhaps by the presence of symptoms of muscular atrophy; whereas others suffer from a very severe girdle pain lasting for weeks and resembling that of locomotor ataxia. Trigeminal neuralgia is a particularly troublesome symptom in certain cases, and the like affection in the intercostal and ischiatic nerves is by no means infrequent in some epidemics. Each of these neuralgias has its own peculiar characteristic; a few appear periodically, so that they might be mistaken for malaria in certain localities. A great many of the others are uncommonly obstinate, so that they are prolonged far into convalescence, and may last even for years. Herpes zoster

may be seen, particularly in intercostal neuralgia; and it has also been observed that the neuralgias of influenza may become worse at night. Even after their disappearance, painfulness on pressure over the affected nerves may remain for a long time, so that the patients themselves are often astonished at the tenderness of these spots, at a time when the pain has altogether ceased. Some of the patients suffer considerably from myalgia, and the violent pains in the limbs may be accompanied by cramps. The muscles of the back, the thighs, and the calves are involved with especial frequency, and pressure on these groups of muscles increases the pain greatly. Even without atrophic symptoms pointing to the presence of neuritis, the muscular pains may be of long duration, and they may pass from the muscles to the joints. Very common in certain epidemics are such other nervous troubles as hyperaesthesia and anaesthesia of the nerves of the skin - in part distributed over large surfaces of the body, frequently being peculiarly localised. One may see, indeed, total anaesthesia of the second division of the trigeminus. The hyperaesthesia may then also probably spread from the cutaneous nerves to the sensory nerves, and may thus give rise to remarkable accidents. Meningitis or pseudomeningitic troubles are especially suggested by the extensive hyperaesthesia of the skin, occasionally restricted to certain limbs. To these nervous disturbances are added paraesthesiae, which are also developed in the skin and organs of sense, and which make themselves particularly felt in the nerves of smell and taste. Of the symptoms which may persist after the patient's recovery from the influenzal seizure may be noted entire loss of the sense of taste, or of that and smell, or of both together. Not a few of the patients complain of vertigo, and perhaps throughout the whole of the attack, with greater severity at the invasion of the disease. As already stated, the loss of strength of the patient is not infrequently largely due to the existing insomnia - a common symptom. It is frequently complicated by the appearance of delirium, often giving the impression when present as though the patient were sleeping and dreaming with open eyes, but which increases until pronounced attacks occur, reminding one in every way of delirium tremens. There are intervals of mental clearness and of oblivion to the preceding delirium; and the latter is occasionally combined with mental disturbances, at times with an exaltation reaching the feeling of euphoria, at others with great depression. The frequency of syncope varies according to the epidemic, and it has been in the older epidemics so common as to cause the historians thereof to recognise a syncopal form of influenza. One of the commonest of the nerve troubles of influenza is debility, the same occurring either in the form of a sudden exhaustion and marked loss of strength, or of a long-continued feeling of weakness. This prostration of the bodily strength is especially notable when no other severe symptoms of the disease are present, the patients perhaps being extremely anxious to work but manifestly unable - the state of affairs well illustrating the old adage of "the spirit is willing but the

flesh is weak." Even persons of a cheerful disposition may be attacked by neurasthenia with hypochondriacal manifestations. These patients are not infrequently difficult to convince that they are not suffering from a dangerous disease on account of their great bodily debility, and they cannot be convinced of their capability of greater exertion. The development of hysteria in persons who before their illness with influenza did not present any phenomena which could be looked upon as hysterical, has also been noted. Even young persons of either sex may in this way suffer, and certain writers have reported cases of hysterical form of spasm and hysteroepileptic attacks, at times complicated with weeping spasms. There are also on record instances of hysterical jactitation in such individual groups of muscles as those of the abdomen, hysterical tremor, disturbances of speech, and aphonia. An herediatory or acquired nerve taint can usually be traced in the cases of post-influenza hysteria in children. It may happen also that some of the patients during an epidemic develop a marked somnolence, increasing perhaps to coma, without any other cerebral symptoms - this constituting the so-called comatose form of influenza. The Italian outbreak of the peculiar disease known as "noma" or "sleeping sickness", in 1890, is well-known. This affection presented symptoms which were similar to the observations of Krannhals, in which the clinical picture resembled that of a cerebrospinal meningitis which was not yet fully developed. According to the description of these cases of somnolence, appearing in an epidemic form, the greatest probability if that they were cases of influenza in which these comatose conditions were pronounced, as they may also be in hysteria. That they had accumulated in certain parts of the world, need not seem more remarkable than the fact that other forms of influenza have shown an inclination to make their appearance in a cumulative manner in certain localities at a certain time. This noma can be clearly be distinguished from cerebrospinal meningitis, especially as pneumonia was a frequent complication. The presence of hyperthermia in influenza distinguishes the coma of this disease from that of diabetes mellitus. Various motor phenomena may be observed in influenza patients. Thus, chorea may develop consequent upon the nervous excitement of the attack, its appearance being noticed during convalescence. Various muscular spasms may set in. After an attack the patient may perhaps be seized with an excruciating pain at the base of the chest, this at times spreading with increasing severity into the diaphragm, and radiating towards the nape of the neck and scapulae. At the anterior insertions of the diaphragm, as well as on either side of the lateral portion of the neck and on the breast-bone, painful pressure points may be found, and severe hiccough may then make its appearance - this perhaps markedly increasing when the patient converses or yawns or vomits. In a few days the patient recovers; and this outcome may be observed even when there are such grave motor symptoms as post-influenzal girdle-pains of the trunk and violent pains in both lower extremities, accomapnied by increased patellar

reflexes and ankle clonus, accompanied by disturbances of sensation, marked ataxia, and great weakness in the limbs, attended by incontinence of urine. Some of the patients develop spastic convulsions of the face on one or other side; and there are cases on record of peculiar clonicotonic spasm of the muscles of the whole body, so that they were at times thrown into a tonic contraction, - this condition alternating with tetanoid tonic spasms of the fingers, accomapnied by a peculiarly irregular position of the digits or of the forearms and of the legs, without symptoms of meningeal implication. I have also seen somewhere notice of a case in which these spasms appeared in the right half of the face and in the extremities of the right side. Symptoms of paralysis occurring in peculiar distribution over the lateral half of the body, and similar to these spasms, which very strongly reminded one of hysterical conditions, have also been observed. Some sort of toxin must be responsible for the occurrence of all the nervous phenomena described, the same being purely of a functional character as evidenced by the absence of atrophy, the remarkably rapid recovery no matter how serious the nerve trouble may have at first appeared.

INFLUENZA IN ASSOCIATION WITH OTHER AFFECTIONS.

It sometimes happens that influenza manifests itself in conjunction with some other acute or chronic disease, such as the exanthemata, acute articular rheumatism, erysipelas, certain neuroses, malaria, diabetes, gout, emphysema, phthisis pulmonalis, hepatic, urinary, and cardiac affections, etc. One or other of these maladies may either precede or follow influenza also; and it is therefore in these circumstances interesting to inquire as to the behaviour of the affection that we are now considering. The association of influenza and typhoid fever is commonly observed, a sort of hybrid type being thereby constituted, of a perverse character, and which is very apt to have serious consequences. This outcome is, however, by no means invariable and it would seem that very few accurate observations on the subject have been forthcoming. The six cases described by Potain all ended in recovery, without complications and without serious after-effects. Nevertheless, one of the cases which he treated later ended fatally during a convalescence relapse. One of Ménétrier's cases of typhoid fever following influenza also died. Rendu publishes an interesting experience: a boy apprentice suffered with influenza for six days, but was then well enough to resume his occupation, when he was seized with a grave form of typhoid complicated with albuminuria, absolute dumbness, etc., and finally suppurative otitis media. One of Siredey's patients also died from the occurrence of typhoid fever in the midst of an influenza illness, a comatose condition developing at the end of the second week. He thinks that the influenza had been the real cause of the aggravation of the typhoid disease and of the causation of the renal complications observed. There are other cases in the literature, in which individuals had been suffering from influenza, but developed symptoms of typhoid, some of them

dying after convalescence had apparently become established. In some of Widal's cases influenza seemed to be mild from the first and never attained the acuteness of typhoid fever. Chantemesse, on the other hand, saw a soldier, apparently recovering from a mild influenza, suddenly succomb in a few days to typhoid fever of which the diagnosis was never in doubt. It is strange that influenza can attenuate a typhoid infection, when it is held that it aggravates all other infectious diseases, particularly those occasioned by the pneumococcus, streptococcus, colon bacillus, and the tubercle organism. Hanot describes six cases in which streptococcus infection occurred in the course of influenza. In one of these, - assuming a typhoid form, - there developed a broncho-pneumonia, pleural effusion, and finally a basal meningitis which carried off the patient. He found the streptococcus in the pleural liquid, the liver, the spleen, the lungs, etc. Influenza would seem to have an important influence upon the evolution of articular rheumatism, as has been emphasised by Weber, who has often seen rheumatic patients become influenzal. In many cases of rheumatism which he observed there was an anterior influenza infection. In a case of influenza with a pyrexia of a septicaemic type, Carrieu and Pelon were able to effect a cure with Marmorek's serum. Cerebro-meningeal troubles had previously existed. This observation, communicated to the French Congress of Medicine, in 1898, at Montpellier, is entitled "Influenza with Fever of Septicaemic Type; Treatment by Infections of Antistreptococcic Serum of Marmorek; Recovery. It is interesting and remarkable for several reasons: in the first place, on account of the anterior existence of meningeal troubles and of subsequent pleuropneumonia; secondly, owing to the very peculiar temperature curve; and finally, the remedy utilised. Similar cases have been reported by Gaucher, Juhel-Rénoy, Sevestre, etc., and these recovered. The course of the disease in Carrieu and Pelon's case made the diagnosis difficult between that of remittent malarial fever and that of septicaemia. The patient had never been malarial and had not taken quinine, and it would seem also that he had never suffered from any form of febrile affection. There existed no focus of suppuration in the joints, subcutaneous cellular tissue, serous membranes, etc., which could be held responsible for this fever. Carrieu, thinking that he had to deal with a septicaemia due to the streptococcus, gave an injection of 13 c.c. of Marmorek's serum, with the result that the general condition of the patient underwent a speedy improvement - showing that the septicaemic condition was occasioned by the streptococcus which he found in the sputum of the sufferer.

CHRONIC DISEASES.

The injurious influence of influenza upon the nervous system, eg., the aggravation of existing neuroses, is well known to neurologists. Observations in support of this are plentiful, and the point is now no longer mooted. As regards hysteria, one may quote Grasset, Le Joubioux, and Joffroy; for the psychoses, neurasthenia, etc., Séglas, Mariet, and Ballet; for chorea, Villard; and for

epilepsy, Marriot, Kraepelin, etc. Attacks of migraine, epileptiform crises, and various neuralgias undergo aggravation resulting in the multiplication of their occurrence and the prolongation of their duration.

Alcoholics sustain considerable injury from the occurrence of influenza - not only as regards their nervous system, but even as regards visceral affections of a more or less latent character. Thus any existing tremor is aggravated, the heart's action becomes weakened and irregular, nausea is experienced, vertigo becomes troublesome, and various congestions are observed. During influenza epidemics the bronchitis and the broncho-pneumonia of alcoholic patients are accompanied by delirium. Dyspnoea in these circumstances is very pronounced and bronchoplegia is imminent. If they do not actually die, there is a troublesome convalescence to be faced marked by the aggravation of perhaps hitherto latent affections, such as sclerous myocarditis, hepatic cirrhosis, etc. Rendu, who has closely studied the question, says that he has seen, in the case of an alcoholic, an old affection of the liver react upon the heart and give rise to haemorrhagic jaundice and acne. Grave accidents may occur in livery subjects, particularly rapid dilatation of the heart under the action of the toxins on the nerves of that organ.

Biliary lithiasis may be markedly intensified by an attack of influenza, as has been clearly shown by Comby.

The same is true of dyspepsia; and it sometimes happens that the life of the patient is placed in great danger by the engrafting of influenza upon a chronic gastric ulcer or appendicitis.

The injurious effect of influenza upon chronic tuberculosis is well known, and many patients have been promptly carried of by the association of these two diseases.

The disease can also stimulate into activity various syphilitic troubles. Holz published an interesting case, in which a man of 30 years and suffering from syphilis developed, consequent upon an attack of influenza, very severe orbital pains which were soon followed by a slight swelling of the superior border of the orbital cavity with effusion into the eyelids. This lesion rapidly disappeared under suitable specific treatment.

Arthritic patients bear influenza badly, not only because the joint troubles are unfavourably affected, but because various renal and digestive disorders are occasioned and gall-stones may be produced. There seems to be good ground to suppose that, in the case of the gouty, influenza favours the appearance of acute crises. According to Faure, it may give rise to rheumatismal and neuropathic complications, and also to naso-pharyngeal infections.

It is a well-known fact that influenza attacking elderly emphysematous, cardiac, and albuminuric persons oftentimes is attended by dangerous consequences. Capillary bronchitis, bronchoplegia, asystole, and uraemia are of unusual frequency during epidemic periods.

From a surgical standpoint, Verneuil has dwelt upon the unfavourable influence of the disease upon wounds and operations, and this by favouring the occurrence to pyaemia. According to him, the surgical aspect of influenza would require a volume for its special narration. It has been shown that during the last pandemic there were numerous complications solely due to suppurative processes. When influenza favours the occurrence of surgical accidents, it is by producing purulemt collections or cavitary effusions - primary or secondary, single or multiple; and in certain cases all the classical phenomena of purulent infection may be observed. The suppurative inflammation - benign originally - may invade the meninges, as has been observed consequent upon abscess of the eyelid, of the ear, and of the maxillary sinus. The prognosis in the case of suppuration of this kind is unfavourable, and the aid of the surgeon will be required, particularly for the relief of purulent pleurisies. Verneuil has published two cases bearing upon the subject. In the case of the first, - a waggoner of 29 years, who was strong and healthy, - influenza culminated in an unsatisfactory convalescence. A relapse gave place to a bronchopneumonia and occasioned also a pneumococcal subpectoral abscess, a purulent sterno-clavicular arthritis, and a vegetative endocarditis. In spite of due drainage of the abscess, the patient died. The second case was that of a lady of 44 years who, at the close of an influenza convalescence, underwent the partial removal of the breast for a small tumour of recent date, the same being neither adherent to the skin nor the deep parts, with some small glands in the axilla. The operation wound healed quite satisfactorily. Unfortunately, consequent upon the influenza attack, there occurred a slow form of pyaemia, and the patient died at the thirteenth day thereafter. There is not infrequently a striking contrast between the apparent benignity of the local affections requiring the operations and the extreme gravity of the accidents resulting therefrom. The fatality should certainly be attributed to the infection in question. With the exception, says Verneuil, of the operations of urgency, - which invariably constitute a division of their own, - and those which are required for the relief of the conditions which complicate influenza, all operations which would be performed upon an ordinary patient should be postponed in the convalescence of this disease until the same is properly established, bearing in mind also that the said convalescence is usually slow and that relapses are frequent and serious. If the postponement of operation for too long has allowed the patient's life to be in danger, one ought certainly to undertake the operation forthwith, instituting without further delay also a vigorous course of hygienic and therapeutic treatment on rational lines. Operation and other wounds require very careful management when influenza seizes upon the patient, because either one or the other may undergo serious modifications in their course. Though many of the surgical affections behave normally during epidemics, Desmons advises that, except in urgent cases, one ought if possible at those

times to postpone them, but especially those which have to do with the buccal cavities, the nose, the pharynx, and the respiratory apparatus. Bennet has specially insisted upon the pyaemic tendency of wounds when influenza appears; and he says that the numerous cases of acute purulent infection that he has seen under such conditions remind him of the pre-antiseptic period of the surgical art. Verneuil also looked askance at the occurrence of more or less chronic suppurations in the case of certain affections existing at the time of invasion of influenza, - e.g., ovarian cysts, cystitis, hydrarthroses, etc., phlebitis, arhtritis, and lymphangitis being some of the accidents likely then to arise. The affection is very apt to hamper the processes of healing and to undo the good already done in that way. Sometimes a traumatism awakens this affection, and the latter in turn aggravates the former. Then various complications may arise, such as high fever, aevere bronchopneumonia, septicaemia, pyaemia, gangrene of the operation or wound area with erysipelas or lymphangitis of the edges thereof. One should therefore observe very rigorous antisepsis of the part, drainage, and prompt incision of the grippal abscess. The disease may also hasten the course of various tumours. Trelat has frequently observed the tendency on the part of wounds in influenza subjects to heal very slowly, and this he has also noticed in the case of even cold abscesses which have been scraped and packed with iodoform gauze. Prior to Verneuil's classical researches, Jeannel had impressed upon his pupils the malign influence of the disease upon operations which, under normal circumstances made uninterrupted recovery. In the case ofa young woman who had both ovaries taken out, ten days after recovery from influenza, the successful outcome thereof seemed to be beyond doubt. Nevertheless, this operation, to his great surprise, led to the patient's death with peritonitis, delirium, lockjaw, and contractures of the limbs. He was certain of the absence of a primary abdominal infection, and he had not the slightest hesitation in affirming that an abdominal form of influenza was responsible for this unfortunate fatality. The autopsy revealed no trace of a lesion, even a slight one, in either the peritoneum or in the pelvic cavity. Consequently I agree with Verneuil that rational operations, ordinarily benign, properly performed, can give rise to unexpected death if practised at a date too close to the influenza illness.

INFLUENZA AND PREGNANCY.

The unfavourable influence of influenza is now well known. Indeed, I have many times observed it. Various writers blame the disease for the occurrence of abortion; and Ruffié, as an obstacle to safe childbearing, ranks influenza with cholera, smallpox, typhoid fever, and malaria. Séguel is less pessimistic, and gives less discouraging statistics in support of his contention. According to him, at the time of labour the uterine contractions will be feeble and infrequent and unduly prolong the process of delivery of the child. Thereafter it may be very difficult to distinguish the disease from puerperal fever. Thus, in one of his cases, a young

woman recently delivered, the fever, the chills, and the general constitutional disturbance suggested the puerperal accident named. In the course of a few days the occurrence of slow delirium and of a certain amount of swelling of the abdomen gave a suspicion of typhoid fever. Finally the development of acute congestion of the lungs led to the diagnosis of influenza, which the general course of the disease subsequently confirmed. In severe cases after delivery there may occur chills, fever, tracheobronchitis, and bronchopneumonia. After a marked remission the temperature again rises, and bronchopneumonia runs a course of weeks. Amongst the complications may be mentioned pleurisy, purulent conjunctivitis, abscess of the vulvo-vaginal glands, phlegmon of the broad ligament, phlegmasia alba dolens, etc. In the case of the newborn infant, according to Feissinger, Comby, Cadet de Gassicourt, and others, respiratory affections are very rarely observed. In such patients, according to Strassmann, the disease begins on the third, sixth, or ninth day of life; and he holds that the temperature may fall to 95. or even to 90. C. Runge, on the other hand, says that the temperature is raised to fever-height. In these cases there are coryza, dyspnoea, hoarseness, and diarrhoea; and very rapid emaciation occurs. In the serious cases the infant is plunged into a state of somnolence of a more or less intense character. The disease lasts three or four days when it is benign in nature. Such accidents as ocular and aural troubles, pneumonia, and bronchopneumonia are very commonly observed. At the third day the child may die with manifestations of tetanic contractions. The question as to whether there exists an intrauterine infection or a post-partum contagion has been much debated. The influence of the disease in giving rise to premature emptying of the uterus or haemorrhage therefrom has been well established, even by the early writers on influenza. In one of Ménétrier cases, a woman of twenty-six years, abortion occurred at the fourteenth week of pregnancy, and on the seventh day of the disease. We have it on the authority of Proust that the number of confinements markedly diminished nine months after the last pandemic, and he is thoroughly convinced of the unfavourable effect of influenza on pregnancy and the puerperium. Leyden has written much upon the disposition of pregnant influenza patients to suffer from metrorrhagia and other varieties of haemorrhage. Huber denies that the disease is capable of producing abortion. Séguel describes ten cases of uterine haemorrhage from influenza, and he holds that there is something more than mere chance in these and other accidents occurring in the course of influenza in pregnancy. Dealing with genito-urinary affections from the same cause, our author cites some cases from Leclerc's dissertation, comprising various tumours, ovarian cysts, ovarian carcinoma, tuberculosis of the genital organs, etc. According to the last-mentioned author, influenza favours even the transformation of benign tumours into malignant ones. Queyrel tells of some instructive cases, in which there were hyperpyrexia and the occurrence of labour pains before full term. Premature rupture of the membranes occurred, and

complete dilatation occurred, but the subsequent uterine contractions were very weak. He has noticed that influenza may determine suppurations in various organs, and also at times closely simulate puerperal fever. The severity of the influenza cough is blamed especially by Schirsky for the complications observed.

INFLUENZA IN CHILDREN.

The clinical phenomena of influenza in children vary according to the character of the epidemic, and also to the constitutional peculiarity of the individual. Between the mild cases that differ but little from an ordinary catarrh of the upper respiratory tract and the severe cases that exhibit all the phenomena of a profound systemic infection are cases of all grades of severity, and presenting the most varied aspects from local congestions and inflammations. Writers have variously classed the protean features of the disease, according to the prominence of the local symptoms. No classification is, however, entirely satisfactory. As we see the affection occurring in children, cases may be arranged for clinical study into, first, those without prominent catarrhal symptoms and, second, those with prominent catarrhal symptoms. A typical case of the group without prominent catarrhal symptoms begins abruptly with chilliness, quickly followed by severe headache, pain in the eyeballs, and general muscular aching. The various pains are more distressing in this disease than almost any other acute infection, and are quite characteristic. Vomiting is frequently observed. The temperature quickly rises to 102. or 104. F.; the pulse is quickened, although often slower than the temperature would indicate. Prostration comes early, and in all except the mildest cases is pronounced. Mild nasopharyngeal catarrh and a slight persistent cough are usually present. The fever is of an irregularly remittent type, is highest during the first days of the attack, and disappears by lysis. Often for a week or more after defervescence an afternoon rise of one or two degrees persists. A subnormal temperature is not infrequent during the prostration of convalescence. The attack continues for from three to four days to a week, and as the fever subsides the child is left anaemic and prostrated. Convalescence is often protracted, and is frequently interrupted by mild febrile relapses, with symptoms of fleeting engorgements of the respiratory and gastric mucous membranes. In children there is observed a severe form of the disease characterised by the symptoms of profound intoxication of the system. These cases would seem to closely resemble pneumonia in their onset and course, with the pulmonary symptoms and physical signs absent. Vomiting and often convulsions mark the onset. The temperature is high, from 103. to 106. F. There are severe headaches, delirium and stupor, often photophobia and opisthotonos. The symptoms may closely simulate meningitis. The course of these grave symptoms is short. In two or three days they subside, and the convalescence occurs in due course. It oftentimes happens that peculiar features are assumed by influenza in young infants. For even though the temperature is little above the normal, the prostration is extreme. The eyes are sunken, the face

is pale, there is marked apathy, and food is often refused altogether. In other cases there are cyanosis and very rapid respiration, indicating acute congestion of the lungs, although no abnormal signs are present, except very feeble breathing sounds. Nearly always there is a disturbance of digestion, with vomiting and undigested stools. Death may occur in two or three days; sometimes it is postponed for a week, the chief symptoms being gradually increasing prostration, and finally collapse, without the development of any marked evidence locally of disease. In these cases the system seems to be overpowered with the intensity of the grippal toxin. In other cases pneumonia occurs, and the patient dies from this. Regarding the second category, in a large percentage of cases of influenza local symptoms develop dependent upon local congestions and inflammations that are the result of the action of the influenza poison. These local pathological processes cannot be looked upon as complications. The great complexity that is thus given to the symptoms renders it advisable to group cases into clinical varieties. In the catarrhal form either the upper or the lower respiratory tract, or both, may be involved. The peculiar specific inflammation invades the lung tissue in some cases. In the event of the upper respiratory tract being chiefly involved, there are the usual symptoms of a severe, acute rhinopharyngitis and laryngotracheitis. Serous and seropurulent discharge from the nose is abundant, and often excoriates the nostrils. The pharynx is red, the tonsils are swollen and often the seat of a follicular exudate. Rarely a continuous pseudomembrane forms. The inflammation may extend to the Eustachian tubes and middle ear or to the mouth. Swelling of the cervical glands is usual. The laryngeal and tracheal involvement is shown by the obstinate and dry cough, and by the hoarseness of the voice. When the lower part of the respiratory tract is involved, there will be short and frequent coughing, rapid and oppressed breathing, chest-pain, and soreness. Not infrequently one observes also fleeting engorgements of areas of lung tissue without the development of pneumonia. The prominent local symptoms in a smaller percentage of cases are vomiting, diarrhoea, tenesmus, and abdominal pain. This is the gastrointestinal form. The symptoms of a gastrointestinal catarrh go along with the usual general symptoms of influenza, and then, as a rule, fade away. Influenza being more or less of a cold-weather disease, the gastrointestinal inflammation is seldom dangerous, although it may be so in young infants. Erythema and urticaria have been observed in a few cases. It sometimes happens that local inflammations, severe enough to be regarded as complications, are excited by Pfeiffer's bacillus; and, as in the case of measles and scarlet fever, influenza renders the tissues very susceptible to pneumococcus and streptococcus infection - some going the length of affirming that the complications of this disease are chiefly secondary infections. The most frequent and serious complication in the case of children is pneumonia. Bronchopneumonia is the usual form, although lobar pneumonia, running a typical course, is not seldom seen. Abortive and irregular types, probably mixed infections, are common. They are characterised by a short duration, and a temperature, prostration, and cerebral symptoms

out of proportion to the symptoms of local disease in their severity. The pleura is commonly involved, and this not rarely ends in empyema. Pulmonary inflammations usually appear during the declining stage of the disease, although from the beginning the brunt of the attack may fall upon the lungs. Inflammation of the cervical glands fromthroat infection is very common when severe catarrh of the upper respiratory tract accompanies the disease. Suppuration often follows. Catarrhal and purulent otitis media is exceedingly frequent in these cases. Gastro-enteritis of severe type is common in some epidemics. Nephritis and pyelitis have been observed. Children very rarely suffer from the central and peripheral nerve disturbances so commonly observed in adults. Influenza of a grave type is nearly always followed by a severe and persistent anaemia, and for weeks the child is very susceptible to relapses of the primary disease and to catarrhal inflammations of the various mucous membranes. The convalescence in these cases is, of course, prolonged and requiring very painstaking supervision. Children attacked by influenza not infrequently become tuberculous later on, and nasopharyngeal adenoids, chronic nasal catarrh, and enlargement of the tonsils not rarely testify to an antecedent influenza. The age of the child and the nature and severity of the complications will have an important place in the prognosis. In older children mild uncomplicated influenza is an insignificant disease, and even the severe cases with alarming initial symptoms are very seldom fatal. The uncomplicated form is sometimes lethal, and grave complications, particularly pneumonia, are often a source of danger. On account of the anaemia and the susceptibility to other affections that long persist, the remote effects of influenza may be serious.

COMPLICATIONS AND SEQUELAE.

It is somewhat difficult perhaps to accurately define the border-line between the clinical phenomena and the various manifestations of the grippal seizure which may be regarded as complications, which latter, it need scarcely be added are of a most varied character; but it nevertheless behoves me to narrate as clearly as possible the complexus of extraordinary events which may give to the disease a peculiar gravity.

RESPIRATORY SYSTEM.

We have alreadyseen that most important of the complications are those which concern the respiratory tract. The engorgement and bronchitis which occur in the severer cases cannot be looked upon as true complications. In many instances, however, the bronchitis becomes intense, implicating the large and small tubes and giving rise to a prolonged symptomatic fever, which may even be accompanied by delirium. Bronchopneumonia is not infrequent in children and aged persons, and may lead to a fatal result from progressive restriction of the respiratory surface or cardiac failure. This complication develops insidiously usually about the fourth or fifth day, but it may set in as early as the second day, or later during convalescence. The symptoms are at first frequently obscure, and extensive involvement of the lung may take place without great rise of temperature. Croupous pneumonia is less common. It is a late complication, occurring towards the close of the attack or when the patient is beginning to go about. It presents the usual physical signs of pneumonia, and does not commonly differ in other respects from croupous pneumonia of the ordinary form. Both lungs are frequently involved. The crisis may occur late or defervescence may take place by lysis. In some cases, however, the pneumonia occurring after influenza is afebrile. Great feebleness of respiration and a tendency to cardiac asthenia characterise this form of pulmonary inflammation. Low muttering delirium is apt to occur, and there is frequently jaundice with slight intestinal haemorrhage. The influenzal pneumonic inflammation is sometimes followed by abscess or gangrene of the lung. One of the commonest sequels of the grippal seizure is bronchitis, which may be lasting and troublesome. It may be subacute or chronic from the first. In the former case, -subacute bronchitis, -there is little constitutional disturbance, but marked physical signs, and an abundant tenacious, mucopurulent expectoration. The condition is completely recovered from after having lasted for several weeks. In the latter variety, -the chronic, -ordinary treatment is resisted, and there are varying ameliorations, with exacerbations and subsequent chronicity. In short, the affection is chronic from

the outset. In a large proportion of the cases one observes bronchopneumonia, not only as a complication, but also as a sequela - a fact which is sufficiently accounted for by the catarrhal inflammation of the respiratory mucous membrane and the acute prostration which the patient experiences. I have often been impressed with the frequency with which croupous pneumonia develops in the course of influenza or during convalescence. The association of these two diseases has much to do with the high death-rate of influenza in certain epidemics - more perhaps than has been generally ascribed to it, for the reason that the symptoms of influenza may, in cases of unusual severity, mask those of the intercurrent affection. Nor is it remarkable that pneumonia, so often intercurrent in acute diseases, should arise as a complication. Occurring as a sequel of influenza, pneumonia frequently involves the upper lobe - apical pneumonia. It occasionally runs a very protracted course, and under these circumstances often assumes the guise of a tuberculosis - pneumonic phthisis or phthisis florida. One not infrequently encounters cases in which the differential diagnosis presents great difficulty, and is rendered hopeful only by the absence of tubercle bacilli from the sputum, and finally confirmed by recovery. In these cases the high and irregular temperature, continuing for several weeks, with copious mucopurulent expectoration, rapid wasting, sweating, apex dulness, with diffuse subcrepitant râles, especially when there is a marked family predisposition to pulmonary tuberculosis, render the clinical picture alarmingly like that of a galloping consumption. Nevertheless, these cases nearly always get well again. The cases in which influenza has been the starting point for actual phthisis pulmonalis are, however, far more numerous. The patients are usually persons in whom the hereditary predisposition is marked or who are living under conditions, such as association with consumptives, which singularly exposes them to infection. Under these circumstances the symptoms of influenza have passed away, leaving usually merely debility with slight cough and expectoration, such as attend an ordinary bronchitis. But these symptoms tend to persist and resist treatment, and the diagnosis of consumption is easy of confirmation by the usual bacteriological examination of the sputum. It is somewhat difficult to positively affirm that the influenza bacillus is productive of pleurisy directly. Plastic pleurisy constantly, pleurisy with effusion occasionally, arise in connection with croupous pneumonia and tuberculosis occurring as sequels of influenza. The stitch in the side of influenza is probably in most cases pleurodynia, as it is unaccompanied by friction sounds and, as a rule, quickly disappears. Intercostal neuralgia is not rare, even with herpes zoster, in the course of or as a sequel of influenza, and may sometimes mislead; but it is certain that secondary infections, to which the lesions of the bronchial mucous membrane expose patients suffering from influenza, sometimes towards the close of the attack, and often during convalescence, may reach the pleura and give rise to inflammation of that structure. The pleurisy arising under

these circumstances may be plastic, or it may be accompanied by serous or purulent effusion, and does not differ from that caused by similar infections under ordinary circumstances. To this general statement there must, however, be noted an exception. In a number of instances in persons previously in good health, one sees influenza followed by pleurisy of an unusual form. The symptoms have been acute and very severe. Among them the following are especially marked: Great pain, limited to the region of the apex, irregular high temperature, coarse, rubbing friction sounds, slowly increasing dulness, with feeble distant breath sound, no bronchial respiration; cough has been slight or absent, and there has been little or no expectoration; constitutional disturbance has been great; the physical signs at the base and upon the opposite side have been without significance. These phenomena have warranted the diagnosis of a rapidly developing apical pleurisy with great thickening, and this is perhaps confirmed by autopsical examination. In other instances recovery slowly takes place with retraction, restricted movement, and permanent impairment of resonance, though the general health of the patients has remained good, and tubercle bacilli cannot be found in the material raised from the lungs. The bronchitis following influenza may be accompanied by asthma.

CIRCULATORY SYSTEM.

Influenza conforms to the custom of other infectious diseases of an acute character in inducing anaemia. It is neither constant nor intense, the brunt of the affection, except in occasional and rare instances, falling rather upon the nervous system than upon the blood. It usually can be treated successfully, and presents no special characteristics. But sometimes the pernicious form of anaemia is observed, and then the prognosis is entirely unfavourable. Various forms of cardiac disease may be induced by influenza, which has the effect of doing further injury also in the case of hearts previously unsound and of aggravating pre-existing symptoms. The influenza bacillus has a powerful depressing influence upon the organ, both during and after the attack. The nutrition of the cardiac muscle is impaired and its innervation is deranged and enfeebled. Cardiac asthenia, often of a high grade, results. Either endo- or pericarditis may occur; and the murmurs observed are endicardial and either haemic or dynamic. It is not always the damaged heart that suffers. Many of the worst cases occur in persons of previously good health. Robust, self-reliant men, who scarcely know what illness is, become feeble, hypochondriacal, and more or less debilitated. It is sad to observe the sufferings - partly physical and largely mental - of these patients. The actual cardiac symptoms are heart consciousness (a concentration of attention on that organ), sometimes distress, sometimes actual precordial pain, usually paroxysmal, occasionally suggestive of angina pectoris, breathlessness and faintness upon effort, unsatisfactory sleep, disturbed by dreams and startings, headache, and great langour and malaise. The physical signs are simply those of an enfeebled and irregular heart action. They consist of weak impulse,

faint first sound, and now and then an indistinct soft systolic murmur. The pulse is small, feeble, arhythmic, and intermittent. Much more distressing to the patient and his friends are the mental symptoms. To his general feeling of depression and disability are added tormenting fears of permanent invalidism or sudden heart failure. The condition is always distressing, sometimes alarming. Fortunately, however, experience has shown that the prognosis is favourable. These cases, even after they have lasted a year or two, quickly recover under proper treatment. In another group of cases the nutrition of the heart muscle is fairly well maintained, its innervation being chiefly affected. Here we have the intermittent heart. At regular or irregular intervals the heart drops a beat. If the patient is aware of this fact, either from feeling his own pulse or from the disagreeable precordial sensation which sometimes occurs, he is apt for a time to be much distressed by it. Presently, however, with returning health the heart dropping ceases to annoy him. In a small proportion of cases it continues to be a lasting cause of distress and valetudinarianism. Intermittence of the heart's action sometimes resists the efforts made to cure it, and in occasional instances it is always experienced. The grippal attack may also give rise to pain over the region of the heart, arhythmia, tachycardia, and brachycardia. Myocarditis is now and then observed. Phlebitis, as in other acute diseases, may complicate influenza. Numerous cases of the condition have been observed. Arterial thrombosis, acute aortitis and arteritis, as well as aneurism, gangrene of the limbs, and purpura haemorrhagica are other conditions that may complicate influenza or follow it.

ALIMENTARY SYSTEM.

The various intestinal affections due to influenza have already received some mention, and it is unnecessary here to recapitulate them. They are usually not persistent. Occasionally a tendency to diarrhoea persists, and not infrequently one observes membranous colitis follow the gastro-intestinal form of influenza; and the latter affection is probably an occasional cause of catarrhal appendicitis. Jaundice and other hepatic troubles have also already been referred to.

NERVOUS SYSTEM.

Meningitis is specially to be mentioned amongst the complications that concern the nervous system. It is, however, of rare occurrence. The cases may run an acute course like that of epidemic cerebrospinal fever, with intense headache, convulsions, delirium, stupor, and opisthotonos, or the symptoms may be of moderate intensity and the patient slowly recover. Several cases of cerebral abscess have been described as complicating influenza; and peripheral neuritis sometimes complicates the grippal attack. General asthenia constitutes the principal and most constant sequela. The profound nutritive derangements of the acute processes are at once followed by manifest loss of strength of varying grade and duration. It is, however, often extreme, altogether out of proportion to the intensity of the symptoms and their duration, and frequently lasts for weeks or months. It is

important in this connection to note that this post-influenzal asthenia bears no constant relation to the original severity of the case, many apparently light attacks being followed by profound and prolonged loss of strength, while cases of great intensity often terminate in comparatively early and complete recovery. Nor is this difference in many instances merely accidental. The manifest explanation is to be found in the fact that in severe cases the patients are obliged to keep to bed and there, of course, to receive necessary care during the acute stage of the disease, while there is a neglect of those symptoms which are of slight degree. The commonest sequels of influenza are headache, insomnia, and neuralgia. The nervous derangements which follow the disease may consist of mere general loss of tone, - neurasthenia with gastric, cardiac, or spinal symptoms predominating, - or they may assume the definite aspect of substantative affections, such as hysteria or chorea; again, various motor or sensory palsies, manifestations of peripheral neuritis, may arise; finally, psychic disorders, as melancholia and the insanities of malnutrition may occur. The nature of the nervous trouble is doubtless determined by hereditary or previously acquired predisposition on the part of the individual, and its course is not different from that of similar affections arising under other circumstances, and especially after the other acute infections, as, for example, typhoid fever. The prognosis is in the main favourable. With reference to insanity, it would seem that its frequency has been greatly overestimated, and it is probable that persistent insanity arising as a sequel of this affection is as a matter of fact rare, and that it occurs chiefly, if not solely, in those already strongly predisposed to mental disorder, in whom the attack acts as an exciting cause, not specifically, but in the same way as any other strongly disturbing agent of the nervous system.

URINARY SYSTEM.

This system less often suffers from influenza than such other infectious diseases as diphtheria, pneumonia, etc. Albuminuria has frequently been observed; it may be referred to the fever, but many regard it as a symptom of special frequency in influenza. As a rule, the albuminuria is only temporary. A true nephritis rarely is observed. A simple parenchymatous degeneration of glomerulonephritis has been described, and a mixed infection is probably responsible for the necrotic processes now and then reported. In the case of a glomerulonephritis, Bowman's capsules are dilated and filled with numerous cells between the capsule and the glomeruli, and which compress the latter more or less. This explains the diminished secretion of urine. Haemorrhagic symptoms are sometimes observed. Cystitis may be met with. Haematuria is somewhat rare, and several cases of glycosuria and diabetes mellitus have been reported. In some cases there was merely a temporary appearance of sugar in the urine, in others diabetes of longer durationAn existing diabetes is unfavourably affected by influenza. There have been described amongst the affections of the bladder certain nervous disturbances which presented themselves

under the forms of paresis of the bladder and retention of urine, spasms, and painful sensations in the bladder. It is only very rarely that one comes across a case of haemorrhage from that organ and of cystitis.

GENITAL ORGANS.

We have already seen that bleeding from the uterus may occur, and also that menstruation may be modified under the influence of this disease. The occurrence of abortion is also one of its well-known effects, and this accident is frequently mentioned by even the earlier writers, some of whom noted the decrease in the birth-rate during severe influenza visitations. This is held by one school to be due to acute haemorrhagic inflammation of the decidua, and by the other to metrorrhagia which also occurs in the non-pregnant under the action of the influenza poison. Orchitis is one of the affections of the male generative organs that is not infrequenly observed in this disease; the scrotum has been known to become gangrenous or to be the seat of suppurative processes. Gangrene of the penis and periorchitis have also been described. The parotid gland may or may not be simultaneously affected.

THYROID GLAND.

Cases of influenza complicated with acute thyroiditis have been reported; recovery is usual. It usually appears about a week after the defervescence of the disease, when the patient experiences a severe pain in the neck, difficulty in deglutition, and fever; and the part becomes greatly swollen. The overlying skin is red, tender, and glistening.

PAROTID GLAND.

The occurrence of parotitis in influenza has already been referred to; it is usually unilateral and is recovered from. The possibility of a coincident epidemic of mumps must not be overlooked.

ARTICULAR AND OSSEOUS SYSTEMS.

These systems may be affected to a marked degree in influenza; and some have regarded these affections as analogous to the joint disease which makes its appearance amongst horses in epidemics of epizoötic disease. Even after the subsidence of the influenza, severe forms of this kind of affection have been reported. It is a common enough thing to come across cases of rheumatism of the joints and bones, together with sensations of tearing and pulling in the limbs and along the spine. Multiple arthralgia is also not very are in influenza, and it usually is seen in connection with the larger joints. It is difficult to say how often true effusion occurs into the joints in consequence of an irritation of synovial membranes. Witzel describes cases in which the articular inflammations caused particularly severe symptoms, or ended in chronic dropsy. He also mentions more minutely the rheumatoid affections of the bones in influenza, which reminds one strongly of the similar affection occurring in typhoid fever and gonorrhoea. He tells of one case occurring in a child in which this affection of the bones appeared where, during the attack of influenza, the bone had been contused; in others a slight enlargement of the tibia due to an old injury

was present before the influenzal affection settled there. In another case there was a periositis of the lower half of the right thigh; the bone seemed as though surrounded by a tough, firm infiltration which was very sensitive to pressure. The treatment, which was followed by recovery, consisted chiefly in fixation. He also mentions a case of suppuration of the knee-joint, the origin of which could be referred to influenza. Kroenlein and Walker also observed cases of acute purulent inflammation of the knee-joint, Moser met with two cases of periosititis of the upper jaw, Boese with one case of purulent periosititis of the tibia in a young and strong adult. Leichtenstern mentions a peculiar, very painful inflammation and thickening of the plantar fascia. One not infrequently observes very painful affections of the fascia of the pectoral muscles and those of the thigh, after influenza, which appear to be rheumatic affections, and in which in many cases there develop in the painful area a great number of small nodules reaching the size of a pea. These affections may be quite intractable, the best results being obtained from the exhibition of the salicylates. We have here to deal, therefore, with inflammatory processes of the fasciae. There are undoubtedly many cases of mixed infection in influenza which induce inflammatory changes in several joints at the same time. In how far the influenza is responsible for this we cannot say, but in this connection it is to be noted that there have been cases showing a marked aggravation of surgical diseases during influenza. Verneuil has arrived at the conculsion that influenza in its character as an infectious disease exerts a deleterious influence on injuries and surgical operations during the attack as well as during convalescence; and this is shown by a tendency to suppuration - the latter being observed in conditions in which, on account of antisepsis, it is usually absent. Surgical diseases are also aggravated by the occurrence of phlebitis, arteritis, lymphangitis, etc. Influenza has been known to induce grave suppurative processes in the bones with perinephritis and pyelonephritis. As a whole, the pyaemia of influenza seems to Verneuil to run a milder course clinically as well as anatomically than pyaemia does ordinarily. Operations, we have seen, are of course indicated in the suppurative complications of influenza, but they should be performed in persons who have suffered from influenza only if they are in perfect health, and internal antiseptic medication should be instituted as a preparatory measure.

CUTANEOUS SYSTEM.

It is by no means unusual in influenza to find the skin of the face reddened and swollen, so that one is probably justified in assuming a paralysis of the vessels as the cause of this symptom. The redness of the skin in many cases spreads far beyond the face over the whole body. This eruption is usually not uniform, but occurs in spots, and then presents an appearance similar to the exanthem of measles or of scarlet fever. Some writers have described especial varieties under the names of scarlatiniform and rubeolic, which are in fact frequently quite difficult to distinguish from true measles and

scarlet fever. This rash often resembles that caused by antipyrine, but it occurs in cases in which that drug has not been exhibited. It generally occurs during the febrile stage, and when, as often happens, there is a contemporaneous hyperaemia of the conjunctivae or painful affections of the throat in existence, the similarity to measles or scarlet fever becomes very striking indeed. There is no form of eruption that can be proved to be peculiar and specific to influenza, though several forms have been so affirmed. A peculiar eruption which was described by Aman probably belongs to the metastatic eruptions in septicopyaemic conditions. Schwimmer has described a polymorphous erythema exudativum. Hoffmann observed in 200 cases of influenza 5 cases of an exanthem, among them 2 of very pronounced erythema. The forms under which these eruptions appear are, in addition to those mentioned, urticarial, herpetic, and erysipelatous. The urticarial eruption is frequently found among the other forms. A case of urticaria pigmentosa occurring in the course of influenza has been reported by Teubner. The morbilliform and urticarial eruptions are extraordinarily evanescent, as are also the general redness of the skin, the rarely encountered roseola-like exanthem, and a macular one which resembles that of typhus fever. Of somewhat longer duration are the herpetic eruptions. These occur as herpes labialis, or on the face, the nose, or the eyes. Herpes (facialis or labialis) is said to occur in some 6 per cent. of influenza cases. Among the skin affections which Schwimmer described, the herpetic forms were the most frequent; he met with herpes iris and circinatus in 2 cases. Leichtenstern observed herpes in 4 per cent. of his cases, and that somewhat more frequently in those which were complicated with a pneumonia. Herpes of the tongue has occasionally been reported. Herpes zoster also occurs, sometimes on the chest accompanying intercostal neuralgia, in a few cases in the region of the supraorbital nerve, and also in that of the sciatic. Hoffmann mentions a case of herpes in which the whole left side of the face between the lower eyelid and the upper lip, also a part of the lip itself, was covered with groups of vesicles. These forms have usually been observed during the decline of the influenza attack, but a few cases of urticaria eruption and herpes zoster have occurred as late as fourteen days after the cessation of the disease, so that they may be designated as late exanthemata. Krannhals also most frequently observed herpes of the face, more rarely of the trunk and extremities. As a curiosity may be mentioned the unique case in which, after the cessation of the fever, an intense scarlatiniform exanthem appeared; it was strictly symmetrical, confined to both arms and forearms, and was accompanied by great itching; it lasted five days. Erysipelas occurs in about a per cent. of influenza cases, and during the pyrexial stage. Miliary vesicles frequently occur, which is not to be wondered at considering the tendency to diaphoresis existing. Transitory oedema may be observed, and there have been several cases of eczema published. Boils are not nowadays common, at least so much as in the earlier epidemics. Petechiae and large hemorrhages, also profuse effusions of blood under the skin,

have been described. Many cases of hyperaesthesia of the skin point to an affection of the cutaneous nerves, which may become so severe that even the feeling of the pulse is painful. Itching of the skin, sometimes very severe in character, may be present and may persist for a long time. Alopecia areata is probably to be classed among the dermatoneuroses of influenza. It was observed in one of the published cases, a woman of 35 years who had experienced severe headache while suffering from influenza. After the second attack the hair began to fall out, and bald spots began to develop within the areas of the supra-orbital and occipital nerves. Later on the headache ceased, and the hair returned. In this category also, in all probability, belongs the case of vitiligo observed by Simson. Rapid turning gray of the hair of the scalp and of the eyelashes has also been described. Here should be included extreme dryness of the skin, and also the opposite condition, a great tendency to sweating. The heavy sweats frequently make a diagnosis difficult in influenza, when the latter is complicated by a pneumonia or by affections of the bones and joints. These influenza sweats may be so severe as to lead us to suspect grave septicaemic conditions, when they may be of no serious import whatever. They may be observed for months after the influenza attack, and also be so profuse and annoying as to make the patient's life a veritable burden; atropine is usually unavailing, though cure can usually be effected by salipyrine. Impetigo folliculitis, purpura haemorrhagica, pemphigus simplex, and pemphigus haemorrhagica are rare forms of skin disease in influenza. The occurrence of the latter has led some to believe that influenza is in some way related to dengue, if not actually a variety of that disease. But dengue, in its epidemic form, progresses much more gradually than does influenza, and in dengue the articular affections present the most prominent symptoms. Although the skin eruptions of dengue may be absent in whole epidemics, the exanthem nevertheless occurs much more frequently in dengue than in influenza. Both diseases present a similarity in that the exanthem is of such a polymorphous character. The rash of dengue shows certain peculiarities - e.g., there are both initial and terminal varieties, either of which appears only in very isolated cases during influenza; furthermore there is an extensive desquamation in dengue, large areas of skin perhaps peeling off in toto.

THE EYES.

The ocular manifestations of influenza are, as one may well imagine, more or less frequent and various according to the epidemic - in the same was as in measles, smallpox, typhoid fever, erysipelas, etc. The ocular affections of this disease vary from the slightest form of conjunctivitis to the very gravest of eye troubles, and hardly a tissue of the eyeball and its adnexa is exempt. Besides the great variation in gravity, there may be a great variation in the frequency of ocular diseases according to locality. In many places the eye affections are regarded as exceptional, in others as characteristic of influenza. The ocular affections of this disease may be classified into inflammatory

symptoms, symptoms referable to the nervous system, and symptoms referable to the circulatory apparatus. Among the inflammatory affections those involving the palpebral conjunctiva, cornea, uveal tract, retina, and Tenon's capsule are the most frequent. The most common form of palpebral affection is an oedema of the eyelids and the formation of abscess. Oedema of the lids may occur with or without conjunctivitis. The first occurs more frequently in the period of convalescence, when the lids may very suddenly, for example during the night, become greatly swollen, and the skin presents a rose tint, quite different from the redness caused by erysipelas. The affection is benign and runs a rapid course. Abscesses of the eyelids appear more frequently among the sequelae and with its occurrence the temperature may again rise, the lids become oedematous, take an erysipelatous hue, and pus forms in them. On incision foetid pus is evacuated; thus affection is also benign, and heals within a fortnight if well incised and drained. The most frequently occurring affection is conjunctivitis, which makes its appearance in most cases as a simple catarrh, differing from it only in that it develops more rapidly, and also recedes more speedily; it is accompanied by photophobia, lachyrmation, sometimes by a mucopurulent discharge; in some cases there is superadded a true episcleritis. This affection may also occur without a nasal catarrh, and moreover, the conjunctival changes, which occur nearly always during the stage of fever, also not infrequently make their appearance as a sequel or a complication, and they accompany the often grave affections of the cornea and the conjunctiva. Cases of episcleritis are reported in various epidemics; and one now and then sees instances of conjunctivitis remarkable for their intractability. Althaus has described symptoms which occurred so frequently that he at first thought of the gonorrhoeic form, in which small haemorrhages are also met with in the subjunctival and episcleral tissue. Certain other writers have reported hyperaemia of the conjunctiva in influenza, true inflammation of this membrane being apparently much more frequent. In some of the cases the inflammation was observed to take on a fibrinous character; eczematous inflammations also occurred, and occasionally there were catarrhal swellings and oedema of the eyelids. The lachrymal ducts may also be involved. In occasional cases there may be a unilateral and purulent dacryocystitis, distinguishable from the like idiopathic affection only by the unusually good results of daily irrigations. The direct extension of the process from the nose cannot be doubted here. Saemisch, who has given considerable attention to the subject, tells us that there are two peculiarly rare forms of keratitis - viz., keratitis punctata superficialis and keratitis dentritica exulcerans, for the latter of which herpes corneae febrilis is considered by him as a prodromal stage. Keratitis punctata preferably attacks youthful individuals, and usually involves both eyes. It is generally accompanied by a catarrh of the respiratory organs, and is ushered in by a violent catarrhal conjunctivitis with marked ciliary injection. As far as the etiology,

seat, and sequence of the corneal infiltration are concerned, it is said to resemble herpes corneae febrilis, which occurs especially in febrile diseases of the respiratory organs together with herpes nasolabialis. Keratitis dentritica exulcerans is minutely described by various observers, some of whom regard it as a herpes corneae cachecticus, as this form is also met with in afebrile conditions, especially when there is lowering of the general nutrition, as in the long and tedious convalescence of influenza and in scrofula and tuberculosis. In these cases it is interesting to note that there is an absence of pain and of symptoms of infiltration, and the sensitiveness of the cornea is diminished. One also sees unilateral punctate inflitrations of the cornea accompanied by hypopyon, also keratitis dentritica, after severe attacks of influenza, also a keratitis parenchymatosa, and finally perforation of old corneal ulcerations as a result of violent sneezing due to influenza. The majority of authorities see in keratitis dentritica a developmental stage of the form of herpes above mentioned, caused by a necrosis of the covering of the herpes vesicle with loss of epithelium. Healing is very often delayed, linear opacities, etc., being formed. A malignant course, with suppuration and disintegration, is not infrequently observed in connection with the corneal diseases here mentioned; and cases of eczema racemosum have also been described. Among the affections of the eye very seldom observed in this disease are such as a primary tenonitis. It is perhaps a cause of the frequently occurring pain in the eyes on movement; and this inflammation of Tenon's capsule must not be mistaken for secondary tenonitis, in which the inflammation proceeds from the globe; in the latter case the exudation is often of a plastic nature and leads to adhesions between the globe and the wall of the capsule. Tenonitis occurring in influenza may be purulent, and has been known to cause blindness in consequence of the escape of pus from the capsule into the globe; in other cases a serous and fibrinous inflammation accompanied by oedema of the lid, protusion of the eyeball anteriorly, loss of mobility, and oedema of the conjunctiva, has been observed. - in these cases the symptoms receding after a few days. The normal ophthalmoscopic findings in those cases in which there is an absence of a suppurative tenonitis must be specially taken into consideration in making a differential diagnosis between inflammation of Tenon's capsule and that of the orbital cellular tissue. Influenza is not infrequently also complicated with neuroses of the eye. Thus, we encounter painful sensations like neuralgia, or like neuritis when the pain is continuous. When the eyes are at rest, and at night, the pains are relieved, but they are incfeased by pressure or when the ocular muscles are in motion, particularly in near work. Saemisch considers these neuralgic pains analogous to the so-called symptomatic neuralgias that we meet with in malaria, smallpox, and typhoid fever. Eversbusbh assumes an affection of the muscles themselves, resembling the myositis in trichinosis. Gradenigo attempts a more definite explanation by implicating the sympathetic and the increase of intraocular pressure. Aside from the

impediment to muscular activity, which is induced by the pain, there may be interference also with the motor functions, with which, without symptoms of any nerve affection, the inner or outer muscular tissue of the eyes is involved. Here there is a disturbance of accomodation, partly in the form of an accomodation asthenopia, but also with peretic symptoms. Athoff observed an extreme bilateral paresis of accomodation in a case combined with ophthalmoplegia externa and paresis of the muscles of deglutition. Oppenheim attributed these symptoms to a polioencephalitis superior and inferior, also to a nuclear paralysis of the trochlear muscle and of the sphincter muscle of the pupil. Nevertheless, there must be recognised the possibility of a peripheral source, in which case the affection would present a greater similarity with those observed after diphtheria. In his Athoff's other cases, there was a paresis of accomodation of varying intensity. These latter cases, according to him, resemble more closely the picture of exophthalmoplegia externa, as it has been observed on a syphilitic, tabetic, or paralytic basis, or perhaps also after the ingestion of decomposing food. Other forms of paralysis have also been observed, such as those of the rectus externus and trochlearis, which show a still greater similarity to the paralyses following diphtheria. Influenza does not so often implicate the retina. Saemisch has described a few cases in which atrophy was present, but in which the characteristics of its neuritic origin were absent. He assumed the presence in this connection, on account of the extreme peripheral concentric contraction of the visual field, of a retrobulbar process, mainly a lesion of the peripheral portions of the optic nerve, but left it open for discussion whether this lesion consists in a perineuritis or perhaps in a haemorrhage into the inter vaginal spaces of the optic nerve accompanied by compression of the latter. The symptoms described here and there in the literature refer either to retinal affections with a pathologico-anatomical basis, or to functional disturbances. To the former class Ehrlich refers the retinitis with exudation described by Dente, Rampsedie's case of detachment of the retina with retinal haemorrhage, and a case observed in one of the German hospitals of embolism of the central artery of the retina, not, however, involving the macular branch. Here also should be included perhaps the cases reported of hyperaesthesia of the retina and marked hyperaemia of the optic nerve, as well as those of partial blindness with retinal ischaemia. Temporary or permanent amblyopia may be induced by the influenza attack; and the optic nerve itself may become affected in the form of a retrobulbar optic neuritis, or an atrophy of the optic nerve, or of a papillitis. Several cases of these conditions appear in the literature. Neuritis multiplex has been described; also total blindness, yellow vision, and deep-seated severe ocular pain. Circulatory disturbance may induce conjunctival ecchymoses, though this may be due also to the cough alone. Opacities of the lens and embolism of the central artery may occur; but in none of the published cases of influenza eye troubles has Pfeiffer's bacillus been discovered.

THE EARS.

Auricular complications are of by no means infrequent occurrence in influenza, and this is largely due to the tendency of the nasal or pharyngeal affections to spread upwards to this region. Ear disease is very apt to be overlooked by careless observers, and it would seem justifiable to assume that not a few of the cases of cerebral irritation and pain in the head have been due to otitis. Nevertheless, the ear may be implicated during convalescence and at a time when the patient is regarded as quite cured of the primary disease. A glance at the literature will show how common may be ear troubles during epidemic times. Many of the published cases of otitis are to be looked upon as secondary affections, this opinion being based upon bacteriological findings in great number, which have demonstrated the the presence of staphylococci, diplococci, or streptococci in multitudes in these cases. Scheibe was the first to demonstrate the presence of the bacillus influenzae in the pus of otitis media. In many of these cases doubtless the infection is to be looked upon as a metastasis, while in others a direct extension by way of the Eustachian tubes is to be assumed. In the latter case the bacteria either find their way to this location by violent paroxysms of cough or forcible blowing of the nose. It is obvious that inflammation of the middle ear may also take on the character of a mixed infection, or a number of bacteria which produce pus may give rise to the successive symptoms. The frequency of earache and purulent otitis was noted by even the ancient writers. True influenza otitis is said to be characterised by a peculiar condition of the drum of the ear, that is to say, there occurs a myringitis haemorrhagica bullosa such as is seen in enteric fever cases. In this condition a serosanguinolent discharge takes place, and the affection is ushered in at an early stage of influenza, soon after the beginning of the fever or shortly after its cessation, and is accompanied by violent symptoms on the part of the ear. All cases begin with great intensity as regards the subjective symptoms; dulness of the mind, headache, and pain in the affected ear are often complained of. In certain cases there are abnormal auditory sensation, whereas in others there is total deafness - showing how variable is the impairment of hearing encountered. Resorting to the use of the auroscope, peculiar changes are to be seen in the drum of the organ; it presents a deep bluish-red or blue-black colour throughout its whole circumference, and it is convex, mottled in its surface, or of a peculiar iridescent hue. In other cases, dark bluish-black haemorrhagic vesicles stand out on the red membrane, but there is no tumefaction of the papillary tubercle present. The disease runs a short course; in many cases the pain has already disappeared by the end of twenty-four hours. When the exudate is evacuated by paracentesis or spontaneous perforation of the tympanic membrane, it frequently may assume early a purulent character. This form of ear inflammation is held by some to be specially characterised by the fact that the

spontaneous perforation occurs at the anterior lower quadrant of the drum membrane. Certain writers caution against the operation of paracentesis in these cases. Otitis media is another of the aural affections that may occur in this disease, and it may be either catarrhal or purulent in its character. The frequent involvement of the papillary tubercle distinguishes the otitis of influenza from the ordinary otitis media. Some have specially emphasised the fact that the bony surface of the papillary tubercle very frequently becomes inflamed soon after the beginning of the disease, and that a periostitis in the vicinity of the papillary tubercle often occurs. In consequence of this, in many cases, an abscess forms in the bone and the soft parts of the papillary tubercle. A primary ostitis of the latter not involving the middle ear is also among the possibilities. These affections become dangerous mainly through extension of the inflammation to the meninges. But aside from this, death may be the result of the otitis media. In the larger proportion of cases, however, the outlook is more favourable in influenzal otitis than in that occurring after enteric fever, scarlatina, or inflammation of the meninges of the brain. Among the rare accidents of influenza are to be enumerated labyrinthine disease, neuralgic otitis, auditory hyperaesthesias, and tinnitus aurium. Otitis externa, with the formation of haemorrhagic vesicles in the surface of the auditory canal, has also been described. The disturbances of hearing occurring during an attack of influenza otitis disappear at the most in two or three weeks, but usually before that - disease of the albyrinth accounting for the cases with permanent deafness.

DIAGNOSIS.

GENERAL CONSIDERATIONS.

It is usually not difficult to diagnose influenza under ordinary conditions. The progress of the epidemic, the number of persons attacked nearly at the same time or in quick succession, the rapidly developing asthenia, and the prominence of the nervous symptoms severe to distinguish it from other epidemic diseases. Due regard to the causative relations of the two affections will suffice to distinguish between influenza and non-specific catarrhal troubles attended by fever, malaise, weakness, severe headache, and pains in the limbs. Outbreaks of simple catarrh occur as a result of sudden changes in the weather, and are for that reason most frequent in changeable seasons, and especially at the end of the winter and in the early spring. Influenza, on the other hand, is not in any way dependent upon the vicissitudes of the season, and may occur, as has been shown, indifferently at all times of the year, in wet or dry, mild or cold seasons, and in every variety of climate. There should be no difficulty in distinguishing between it and ordinary sporadic catarrhal fevers, which lack the irritating cough and dyspnoea, the neuralgic and rheumatoid pains, and the characteristic depression, the latter being out of proportion to the other clinical phenomena present. It is also noteworthy that when influenza is about, the general public are not long in being aware of the fact, owing to the great increase in the general mortality and morbidity of the community - so that at the height of the outbreak the number of deaths in many communities is even double of that of the corresponding period of preceding years. It is evident that this sudden increase in the number of deaths is due in large part to the serious mortality of influenza itself when complicated, as with bronchitis or pneumonia. But, in addition, many chronhic affections, such as nephritis, phthisis, heart disease, are awakened to rapidly fatal activity by the influence of the influenza bacillus. While, therefore, there is a tendency during the prevalence of all epidemic diseases to err in regarding almost every case of influenza as belonging to the prevailing affection, it is doubtful whether, in severe outbreaks of this disease, the extraordinary diffusion of the infection is even sufficiently appreciated. On the other hand, it is no less true that sporadic cases of influenza are liable to have their true nature overlooked, and to be regarded as idiopathic catarrhal fever or to be confounded with other infectious diseases.

BACTERIOLOGICAL DIAGNOSIS.

Not until this comes to be more widely practised will the protean manifestations of influenza be properly understood. The morphological characteristics and tinctorial reactions of influenza bacilli will serve for their certain determination; and the bacteriological procedure necessary for all this has already been outlined and need not therefore be further discussed.

DIFFERENTIAL DIAGNOSIS.

The following, in addition to the comparatively trivial affections already mentioned, are the diseases from which influenza may have to be differentiated:

DENGUE.

Dengue, or "breakbone fever" in certain respects closely resembles influenza, and this, too, in both its sporadic and epidemic forms. The accounts of some epidemics of dengue leave no doubt as to whether they may not have been outbreaks of mild influenza in warm climates. The diseases resemble each other in the rapidity of development in great communities and over large areas; in the large proportion of the population affected; in the frequency of relapses and the liability to successive attacks; in the disproportion between the apparent gravity of the symptoms and the very small mortality of the uncomplicated disease; in the sudden onset, the peculiar severity and character of the pains, the great mental and bodily prostration. But in influenza the only eruption frequently present is herpes; there is no affection of the joints, although certain writers have affirmed that in dengue also true evidences of arthritis, such as redness and swelling, are exceptional; the remission and recurrence in the course of the fever are not present; there is a far greater liability to serious complications; and the disease is wholly independent of geographical restrictions. The separation of the two affections must, however, be effected by the bacteriological procedure already outlined.

TYPHOID FEVER.

It sometimes happens that influenza resembles typhoid fever in having great prostration with early bronchitis, and sometimes epistaxis, combined with insomnia, fever, and perhaps delirium. Diarrhoea also often occurs in it, and the typhoid state may develop. The disease is distinguished, however, by the shorter duration, absence of rose-coloured spots, of abdominal symptoms other than the diarrhoea, and of the characteristic temperature curve - not forgetting the differences in the bacteriological findings.

CEREBROSPINAL FEVER.

Influenza and cerebrospinal fever are not frequently confounded with one another, though it appears that from the earliest period these two diseases have often prevailed coincidently or in close sequence. When the meningitis symptoms ensue in a case which has begun as of the catarrhal type, there is less danger of overlooking their influenzal nature. But when, as happens with considerable frequency during certain epidemics, patients are seized with intense pains in the head, back, and limbs, slight fever, rapidly developing delirium and stupor, muscular rigidity, and possibly retraction of the head, or even general convulsions, herpetic and possibly petechial eruption, and when at the autopsy the lesions of cerebrospinal meningitis are discovered, it is evident that careful bacteriological work is needed to decide as to the exact character of the infection. Both influenza and dengue are to be distinguished from other infectious diseases by their remarkable pandemic character. In

various epidemics of influenza the utmost variety in its manifestations, as we have seen, has been exhibited. Although catarrhal irritation of the mucous membranes, with fever of irregular type, is the usual expression, there is a proportion of cases, varying in different epidemics, where the force of the disease falls on the nervous centres, and cerebrospinal meningitis is developed with severe pains of perineuritis, muscular soreness, rigidity of the cervical muscles, and retraction of the head, convulsions, delirium, and stupor. Death is frequent in these cases, but when they recover lesions of the organs of special sense, of the peripheral nerves, or of the nervous centres may remain. It is well known that even in ordinary cases of influenza perineuritis is of frequent occurrence, and many cases of meningitis have been observed. Ambulant cases are not common, whereas in influenza they are by no means infrequently encountered.

TUBERCULOSIS.

Cases of influenza pneumonia may be mistaken for instances of phthisis, but here the detection of Pfeiffer's bacilli will serve for distinction; the coincidence of the two affections must, of course, not be overlooked in its possibility.

PROGNOSIS.

Uncomplicated cases of influenza do not usually succumb to the attack. The very young bear it badly; the old bear it more badly still. Nevertheless, children have in some epidemics enjoyed a considerable proportionate immunity. Healthy persons in the middle periods of life bear it well. Certain pre-existing diseases modify its course unfavourably; among these are chronic bronchitis, emphysema, fatty heart, and nephritis. The debility of advanced phthisis and other exhausting diseases renders influenza dangerous. Death takes place, in by far the greater number of cases, as the result of the complication of the attack, either by some pre-existing affection or by an acute disease arising in its course. The commonest of the latter is pneumonia. Patients presenting very severe symptoms generally recover if they be not the subjects of complicating maladies or very young or very old. Relapses are not uncommon; independently of relapses, second attacks have been known to occur during the continuance of an epidemic; it is often the case that an individual in the course of his life passes through several epidemics of influenza, and is the subject of the disease in each of them. The prognosis is greatly modified by the character of the prevailing epidemic. In some epidemics the deaths are few, and the mortality from other diseases does not appear to be greatly augmented. In others many die of the epidemic disease, and the death-rate of certain endemic affections is much increased. In some of the older epidemics the high mortality was doubtless due to injudicious methods of treatment, among which blood-letting and other depressing agencies were conspicuous. Some of the older accounts also warrant the suspicion that a coexisting typhus had to do with the high death-rate. It is estimated that in the epidemic of 1837, which was a very severe one, 2 per cent. of those attacked died. The proportion of fatal cases in particular epidemics varies in different countries, and even in different quarters of the same city or community. Leaving out of consideration, then, the serious complications, the mortality of the ordinary catarrhal types of influenza is extremely small - certainly less than ½ of 1 per cent.

T R E A T M E N T.

Before dealing with the actual treatment of influenza, it is necessary that some mention be made of the important subject of

PROPHYLAXIS.

This aims at protecting the individual against a possible attack of influenza, and, in the event of his actually becoming a sufferer, of preventing the spread of the disease to others. It must, however, at the outset be admitted that prophylaxis against the attack is theoretical and to a great extent impracticable; prophylaxis against sequels is in the highest degree practical and utilitarian. It seems very largely a matter of chance whether one escapes or not during an outbreak of influenza; and I do not think that there is such a thing as congenital immunity against the disease in the true sense of the word, though one frequently sees persons, - physicians and nurses, for example, - in close daily contact with the affection escape it.

Notification.

The notification of influenza cases was, some time ago, proposed by Sisley - his plan being to make this compulsory just as in smallpox, scarlet fever, etc. It is needless to add that nothing can result from the proposition owing to its obvious impracticability; it would be ruinously expensive and practically disorganise commerce during epidemic times.

Isolation.

The isolation of influenza cases is also a matter of no little difficulty. At the time that influenza was prevailing the person would have to retire to the greatest solitude to escape the disease, and this, in the case of business men and other active and wage-earning individuals, is obviously well night impossible. It is, of course, not to be doubted for a moment that one can entirely avoid the affection in this way. Consequently the indication is manifestly to place patients suffering from pulmonary affections, or delicate persons whose life may be threatened by an attack of influenza, so far as circumstances will allow, beyond the reach of the infection. As comsumptive individuals seem capable of carrying the influenza bacilli for a long time on them, it is desirable that everything possible in sanatoria should be done to avoid infection; and the same is true as regards other places where phthisicals persons are assembled. Upon the reception of new patients in these places, an examination of the sputum for influenza bacilli should be made, for the reason that it is especially in the tuberculous that influenza is liable to cause death. There is no doubt whatever that special danger of contracting influenza exists at the various spas and climatic health resorts to which convalescents flock. It would therefore be wise for every patient suffering from bronchitis, even though not tuberculous, or from any pulmonary disease, to observe the greatest care while in these resorts to prevent infection by

influenza. Under these circumstances, isolation is of far-reaching importance. It is not to be supposed that, considering the highly contagious nature of the disease, all attempts at prophylaxis are necessarily useless, but, remembering this, out efforts should be redoubled in this direction. The fact that during an epidemic the isolation of a patient who has developed symptoms of the affection, either in his home or in a hospital or other public institution, does not secure, as in certain of the other contagious diseases, protection for those about him, is to be explained by the activity of the infecting principle and the intense susceptibility of individuals in all classes of society.

Vaccination.

It has been shown by animal experimentation that it is not possible at present to manufacture a serum capable of conferring an immunity against influenza. Goldschmidt thinks that recently vaccinated persons are not liable to contract the disease, and Küss has published interesting observations to the same effect. My own experience, however, has been to the contrary.

Quinine.

Various writers have proposed to immunise individuals during epidemic times by the administration of various drugs, of which quinine is the best-known example. Graesser has made numerous experiments with this medicament on a regiment of hussars quartered at Bonn. There all the men of one squadron were given eight grains of quinine in half an ounce of whisky for a period of twenty-two days. During this experiment there fell ill, in the first squadron, twenty-two men; in the second, seven; in the third, nineteen; in the fourth, forty-two; and in the fifth, thirty-two. The second squadron was that in which the quinine and whisky had been given to the men. Out of the seven cases of sickness occurring in this squadron, three may be safely excluded, because the disease made its appearance after the termination of the experimental period. The four remaining cases occurred on the second, fourth, fifth, and sixth day respectively of experimentation; after this period no more cases of influenza occurred in the second squadron while the quinine was given, although the affection continued to propagate itself in the others. He is therefore convinced that the result cannot be a mere matter of coincidence. According to Mossé, of Toulouse, the remedy exercises both a preventive and a abortive action on influenza. In in the latter capacity he recommends that it be prescribed in relatively large doses; and in cases of involvement of the organism in secondary infections, he has immediate recourse to hypodermic injections of quinine. He also claims to have immunised rabbits by the intravenous injection of the drug. He concludes that its presence in the blood renders the latter less favourable than otherwise to the development of the influenza bacillus. Quinquina and quinine wine are also recommended by various writers, and also other preparations of the drug. My own experience has been such as to warrant me recommending it as a certain prophylactic.

Injection of Cultures.

According to Bruschettini, the injection of cultures of the influenza bacillus into animals renders

the latter immune. Cantani declares that he has obtained positive results in guinea-pigs, both with sterilised cultures of the influenza bacillus and with peritoneal exudates and emulsions of cerebral substance of animals that had succombed to influenza.

Disinfection.

It is very important that the influenza material be destroyed, and that under all circumstances the sputum be deposited in vessels for this purpose, and also that it be carefully disinfected. The disinfection of the linen and of all articles in general use should be carefully observed in all institutions, and wherever possible. Any of the well-known methods may be employed. The sputum had best be destroyed by cremation.

Various Measures.

In addition to the methods of prophylaxis just mentioned there are others that may be tried. Thus, as the invasion of the influenza bacillus so often takes place by way of the mouth and nose, the irrigation of these cavities with disinfecting solutions may be had recourse to. For this purpose have been recommended such drugs as oil of peppermint and the like, eucalyptus, camphor, menthol, creolin, quinine, phenic, thymic, and boric acids.

GENERAL TREATMENT.

Ordinary cases of influenza may recover of their own accord, rest in bed and warm baths being in themselves sufficient perhaps to effect a cure when the fever is slight, and when prostration and respiratory troubles are absent. Nevertheless, this plan should not be followed. In fact, in a disease as this where secondary infections play so important a rôle, where the clinical forms are often so varied, and where complications of a serious character may suddenly declare themselves, one ought, after careful study of existing clinical exigencies, to meet the indications presented according to age and the possibility of injury to the various organs, attempting to favour the function of the kidneys, promoting the tonicity of the cardiac muscle, and building up and maintaining the forces of the patient in the first few days of the attack in anticipation of asthenia, exhaustion, or relapses. In short, in an affection so protean in its manifestations the indications are multiple, and the greatest care and supervision must be exercised throughout the attack. So it comes to pass that the treatment of influenza is expectant and supporting. Not only are epidemics self-limited, tending to rapidly exhaust the susceptibility of a community, but the individual attack is also of definite duration and self-limited, tending to run its course in from three to four or at most, in the absence of complications, in from seven to ten days. Where the duration of the attack is prolonged beyond the period indicated, complications are almost invariably present. In all epidemics the majority of cases are of mild intensity. The management of this group of cases should be for the most part hygienic. Patients are uncomfortable and anxious, easily fatigued, and unfitted for their usual avocations. It is only exceptionally that they consult a medical man. It is unfortunate, however, that this is the case, since those who continue their avocations

and duties and expose themselves to unfavourable influences during the attack not infrequently manifest at an earlier period the most serious results of the disease. Indeed, the patient should even in the milder cases abstain for the time being from engaging in his daily employment. He should stay in the house, preferably lying down, and only gradually resume his usual occupation.

DIET.

This should be arranged on the lines peculiar to febrile affections. The patient particularly should have milk, and of this one may give two or more pints during the twenty-four hours in divided doses. Egg albumin, stirred in water and flavoured with a little brandy, or egg-flip, milk punch, or gruel, may occasionally with advantage replace the ordinary allowance of milk. Hot beef-tea or concentrated meat extracts are to be avoided. They frequently increase the headache and langour. Cold drinks in moderate quantities are usually acceptable to the patients. Weak wine-whey, a mixture of equal parts of soda-water and milk iced, koumyss, matzoon, and similar preparations, enable the nurse to furnish the necessary changes where the stomach is irritable or the appetite of the patient has to be tempted.

ALCOHOL.

The indication for the administration of alcoholic stimulants depend in part upon the previous habits of the patient, and partly upon his present condition. Abstemious persons may not require them, but those who have been in the habit of taking alcohol, the aged, and those debilitated from previous illness are benefitted by their judicious exhibition.

DRUGS.

QUININE.

The prophylactic exhibition of this medicament has already been detailed; though in that capacity its employment appears to be open to question, there can be no doubt whatever that as a remedy during the actual disease it stands in the first rank. I have frequently proved this in my own practice, and I see that it is also warmly advocated by numerous writers. This general favourable opinion need not be shaken by the impressions received in certain quarters that quinine exercises no influence on the course of the disease. Mossé, of Paris, also ascribes to it a prophylactic and abortive action in influenza. To abort the disease he administered fifteen to twenty grains on the first day, and at times also on the second day. Filatow, of Moscow, speaks highly of its favourable action in the case of children especially. Others, however, affirm that they have seen no benefit arise from its employment; and I observe that Leichtenstern holds that the cases treated with large doses of quinine usually do worse than those which are not so treated. Opinion is therefore somewhat divided as to its utility, but the vast majority of competent observers seem to favour its administration. For Huchard it is anticongestive remedy, a tonic, a vasoconstrictor, and stimulant - the latter action being the most important one in this disease; he gives the sulphate with ergot in pills. Its antiseptic action seems as great as its

antipyretic and tonic, and it hastens the convalescence and goes far towards obviating post-grippal asthenia. It may, of course, be prescribed with antipyrine or other remedy of that class. It is usually given in the form of the sulphate, but any other preparation may be employed, such as the ammoniated tincture, the salicylate, and the hydrobromate; the first is particularly indicated when a stimulating effect is desired, the second when rheumatoid pains are present, and the last-mentioned when headache is severe. Children take modified doses well in milk, syrup of oranges or some other flavoured vehicle.

ANTIPYRETICS.

Drugs of this class are said to have a special action upon influenza, each of them having their special advocates; but these analgesic antipyretics should be used with great caution in view of the tendency to general, and especially to cardiac, asthenia. Nevertheless, the guarded administration of ANTIPYRINE, PHENACETINE, MIGRANINE, ANTIFEBRINE, SALIPYRINE, SALOPHEN, and SALICYLATE OF SODIUM, as well as other members of this therapeutic group will not infrequently be necessary to relieve the agonising pain of influenza. Small doses of phenacetine and sodium salicylate, administered in powder or capsule at short intervals, very often exert a powerful influence in mitigating the sufferings of the patient. That the action of these medicaments is an antineuralgic one is conceded, and antipyrine especially, and also salipyrine, produce wonderfully favourable results in this disease. The beneficial effect of these remedies consists not only in lowering the temperature, but also in a favourable influence on all the nervous symptoms. Pain in quieted, that of the nerves themselves, as well as that of the joints, the bones, and the muscles. The subjective condition is improved, and there are cases on record in which extraordinarily striking effects of these drugs on some of the grave symptoms were observed. In affections of the eye and ear these remedies have also been effectual. Salipyrine usually promptly cures hyperidrosis, and it would seem that both antipyrine and salipyrine have a sort of specific action in the toxic conditions. Antifebrine gives me the impression of being less serviceable than antipyrine, phenacetine, and salipyrine; and some of the cases do very well on migranine. Both salophen and the salicylates are, according to Drewes, exceeded in efficacy by salophen. In severe attacks of the nervous form of influenza he gives it in doses of thirty grains, increased to one to one and a half drachms in the twenty-four hours. In the case of children he prescribes from five to seven and a half grains. Von Mosengeil speaks highly also of the antipyretics, including PYRAMIDON, but especially of ACONITE in combination with antipyrine.

BICARBONATE OF POTASSIUM.

This is one of the old fashioned so-called specifics lauded by Crerar, who affirmed that, in doses of thirty grains, it cures influenza in from four to twenty-four hours. His claims for the remedy made him ridiculous at the time (1891), and I am not aware that any one now uses it.

CARBOLIC ACID.

This was one of Simson's favourite remedies in influenza, he prescribing it in thousands of cases in doses of two minims three times a day, even in the case of children, in a properly flavoured mixture.

DOVER'S POWDER.

Small doses of this preparation, repeated at intervals of two or three hours, have given me pleasing results in this disease.

NITROGLYCERINE.

This is also a powerful sedative, especially in the case of aged individuals. It may be given in the form of the liquor trinitrini (a half to a minim) at bedtime.

EUCALYPTUS.

The oil of eucalyptus used formerly to be regarded as an infallible cure for influenza and a preventive of unfailing efficacy - some even going the length of saturating the hair with it. Its one-time popularity seems now to have deserted it, though in the form of an antiseptic inhalation it is now and then used.

DIGITALIS.

This is a useful remedy in influenza, either in the form of the tincture or as digitaline. Its meets cardiac indications admirably. STROPHANTHUS may be preferred.

CAMPHOR.

This is reliable antiseptic and useful also in heart failure. The spirituous preparation may be employed, or the oil may be injected hypodermically. Long has reported several cases successfully treated with it.

CHLORIDE OF AMMONIUM.

Marrotte, of Paris, speaks highly of this drug in the catarrhal form of influenza, his plan being to give a cachet of eight grains every two or three hours.

POTASSIUM ACETATE.

Gray has prescribed this drug with tincture of aconite in many cases of influenza, and he seems to regard it as one of the most reliable forms of treating the disease.

OPIUM OR MORPHIA.

Dowse strongly recommends the use of small doses of opium or morphia in neurotic patients and those suffering from vomiting; and in his well-known work on a neurological subject he described an interesting case. Certain it is that advantage sometimes follows the administration of small doses of morphia, with which, in cases of sweating, minute doses of ATROPINE may be combined. If there is great restlessness and jactitation, the hypodermic injection of morphia, together with HYOSCINE HYDROBROMATE, proves of service.

STRYCHNINE.

This is one of the most reliable tonic it is possible to prescribe, and it is particularly indicated during the convalescence. It may be given alone or with some preparation of IRON or PHOSPHORUS. Signs of cumulative action will, of course, call for its prompt abandonment.

BENZOL.

Robertson prescribed benzol, in doses of three minims for children and five for adults, even after the

the patient has entered upon convalescence.

PURGATIVES.

Drastic purgatives are now no longer used in this disease. Dumas thinks that CALOMEL tends to increase the antitoxic action of the liver, and he therefore prescribes it at the onset of influenza. According to him, in every instance the dreaded complications are avoided, and the headache, the cough, and the lumbar pains disappear in the course of a few hours.

CACODYLATE OF GUAIACOL.

According to Serâiron, of Bourboule, this drug, in the form of hypodermic injections, constitutes a specific remedy for influenza; and Burlureaux, of Val-de-Grâce, affirms that a dose of 0.05 centigrammes is sufficient to abort an attack and render the convalescence much shorter than it otherwise would be.

HYDROTHERAPY.

I cannot say that I have seen any advantage from the use of warm baths, foot-baths, or diaphoretic drinks, the patients usually preferring to remain undisturbed. Certainly the use of Turkish, Russian, and other baths as a routine treatment of all stages of the disease is not to be recommended. Cold baths are contraindicated; and grippal pneumonia is sometimes favourably influenced by the employment of the wet pack - dyspnoea and other subjective symptoms not infrequently being relieved thereby. Headache and high temperature are often allayed by sponging the patient with warm or tepid water; and every case, of course, must be managed from the hydrotherapeutic standpoint on its own merits on the ground of special indications.

TREATMENT OF COMPLICATIONS, SEQUELS, OR URGENT SYMPTOMS.

CORYZA AND CATARRH.

There is no special treatment required for the milder cases with catarrhal symptoms. When intense the coryza, tonsillitis, laryngitis, and bronchitis are to be treated upon general therapeutic plans. Inunctions of fatty substances about the forehead and over the bridge of the nose are sometimes useful in allaying the distress of the coryza. Animal fats, such as washed lard, cold cream, and the like, are preferable to the mineral fats, for example, cosmoline and vaseline. A 2 per cent. solution of morphine and cherry-laurel water may be snuffed up the nostrils. The pains associated with coryza and the neuralgic pains are to some extent mitigated by a flannel nightcap or silk handkerchief about the head. A strict asepsis of the various cavities and surface of the skin is strongly indicated for the prevention of the secondary infections. The mouth may be gargled with various solutions, such as formol, menthol, phenic and thymic acids, and phenosalyl. For nasal antisepsis one may introduce into the nose a few drops of a 5 per cent. solution of oil of menthol, and resorcin in vaseline may also be employed in this way.

LARYNGITIS.

This is seldom very troublesome, and when it arises may be treated with warm compresses to the front of the neck and other measures according to indications.

BRONCHITIS.

This is frequently very distressing; and for the relief of the annoying cough few drugs are more effectual than opium and its derivatives, especially morphine and codeine; heroin may also be employed. It is important to observe the same caution in administering this group of medicines to infants and aged persons in influenza that is necessary under other circumstances. The influence of carbolic acid in restraining cough makes it a useful adjuvant. In all affections of the bronchial tubes expectorants and emetics are frequently of great service. It must be remembered, however, that apomorphine is not frequently dangerous in its depressing influence and tendency to produce heart failure; on the other hand, the exhibition of ipecacuanha and Dover's powder is to be recommended. Both the bronchial secretion and the cough are markedly benefitted by such drugs as these in combination with quinine or such disinfecting substances as guaiacol and terpene hydrate. Alcohol and various medicated inhalations are frequently of service in these cases.

BRONCHOPNEUMONIA.

This dreaded complication usually calls for such vigorous measures as the hypodermic injection of strychnine or nitroglycerine, digitaline, strophanthine, or caffeine, with or without inhalations of oxygen. In addition to endeavouring to ward off heart failure, other outstanding features must be managed on their own merits and according to indications.

PLEURISY.

This must be treated in the usual way, for example, with sedatives, expectorants, and counterirritants.

CARDIAC SYMPTOMS.

Of these heart failure is the most to be feared, and when suspected must be met with hypodermic injections of strychnine and the other drugs mentioned under bronchopneumonia.

FEVER.

It is not usual to find the temperature so high as to call for vigorous antipyretic treatment. Hydrotherapy should be used with great caution, on account of the possibility of catarrhal and inflammatory complications arising. Phenacetine in moderate doses (three to five grains), repeated two or three times in the twenty-four hours, reduces temperature, relieves suffering, and tends to secure sleep. It is less likely to cause undue depression and relaxation of the system than antipyrine, though all medicaments of this class must be used with great caution in influenza. Small doses of antpyrine (three grains), combined with quinine or sodium salicylate, may also be given two or three times in the twenty-four hours, but require watching as to their effect. Quinine in tonic doses is indicated in most cases.

GASTRO-INTESTINAL TROUBLES.

Gastro-intestinal symptoms must be managed in accordance with general principles. If of moderate intensity, they require no special treatment. If there be marked irritability of the stomach, the diet must be rigidly restricted, and no remedies given internally

save those which tend towards soothing it, such as small doses of the tincture of aconite as a febrifuge, and bismuth subnitrate or cerium oxalate or silver nitrate, with minimum doses of cocaine, for local action in the mucous membrane of the organ. Pepsine may also be called for, and carbolic acid is not without benefit in many cases.

NERVOUS SYMPTOMS.

The intense headache, especially if associated with hyperpyrexia, may be treated with cold applications to the head and small doses of phenacetine or other drugs of that class. But it is so often accompanied by insomnia that codeine, or even morphia, may be required. When pain is not prominent, sulphonal may be sufficient to induce sleep. The bromides, paraldehyde, chloralamide, trional, and chloral may be useful for the relief of jactitation and sleeplessness. The last-mentioned drug, however, must be used with great caution. Other nervous complications or sequels must be treated according to general principles, special attention being directed to the asthenia which is so prominent and disastrous a tendency in influenza cases. Although depletion is to be studiously avoided in influenza, it may here be noted that the only condition in which it may seem justified is when severe cerebrospinal symptoms appear abruptly. Then one may use moderate venesection with immediate and permanent benefit, and the fear that meningitis may become established must constitute the motive. Cold applications to the head, hot foot-baths, or sinapisms to the back and limbs, in conjunction with suitable internal remedies, may suffice if the symptoms are less urgent.

All OTHER COMPLICATIONS AND SEQUELS must be managed according to general principles.

MANAGEMENT OF CONVALESCENCE.

Having seen that the treatment of influenza demands the most careful attention of the medical attendant, - who must be on guard to detect the inflammatory lung complications, which so often lead up to a fatal issue, as early as possible, - that the circumstances of the individual case, the age of the patient, the nature of the complications, and the effect of remedies must be carefully studied, and finally that all measures that tend to depress the general nervous system, the functional activity of the respiratory system or the heart's action are to be carefully avoided, it may next be noted that during the convalescence the patient should be treated with equal - even more - care than those convalescing from other acute infectious diseases. Rest in bed, a systematic diet of high nutritive value, strychnine, iron, and later a change of climate, are important. The patient should be instructed as to the liability of pulmonary disease, which may become chronic, and in regard to the necessity of limiting for a time the applications of his energy. The convalescence is often slow and trying, altogether out of proportion to the severity of the primary attack. Influenza is a distressing affection even in the milder cases, and so often dangerous in its after effects that it cannot be looked upon as a trivial malady, although it is manifestly one of short duration. It is very necessary that the patient, who

so often suffers afterwards from a strangely-persistent and depressing influence of the disease, should not be exposed to the danger of another attack, for re-infection during the convalescence may place his life in the great jeopardy.

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BIBLIOGRAPHY.

The literature of influenza, which in former times excited such a high degree of general interest, has now become so very voluminous that it seems scarcely desirable to include it here. It is, however, for a large part, and principally, comprised in the following publications:

Adams.- An Inquiry into the Laws of Epidemics, London, 1809.

Petit.- Dictionary of Medical Sciences, Part xix, p. 351.

Foderé.- Lectures on Epidemics and Public Hygiene, 1822.

Naumann.- Handbook of Clinical Medicine, Ed. 1, p. 424 et seq.

Ozanam.- History of Medicine, etc., Ed. 2, T. i, p. 29-218.

Richelot.- Researches on Influenza Epidemics, etc., 1835.

Dunglison.- Medical Review, xx, S. 1, p. 444.

Bouvier.- Annal. d'Hyg. Pub., April, 1837, xliii.

Nonat.- Researches on Influenza and the Pneumonias observed during the Month of February, 1837, Paris, 1837-38.

Lereboullet.- Report on the Epidemic of Influenza which prevailed in the neighbourhood of Strassburg during the Months of January, February, and March, 1837, Paris, 1837-38.

Copland.- Dictionary of Practical Medicine, 1846, Vol. ii.

Graves,- Clinical Lectures on the Practice of Medicine, Ed. 2, Vol. i, 1848.

Canstatt.- Handbook of Clinical Medicine, Bd. 2, Erlangen, 1847.

Saillant.- Historical Sketch of and Reasons for the Catarrhal Epidemics, commonly called Influenza, occurring since 1510 to and inclusive of that of 1780 (this publication giving a full account of the older epidemics of influenza).

Schweich.- On Influenza, Berlin, 1836.

Gluge.- On Influenza or Grippe, etc., Minden, 1837. (This gives a good critical review.)

Hirsch.- Handbook of Historical and Geographical Pathology, i, New Syd. Soc. Transl., 1883. (Enters fully into certain epidemiological factors.)

Fuster.- Monograph on the Catarrhal Disease, Montpellier, 1861.

Cullen.- Synopsis Nosologiae Method., Edin., 1792.

Webster.- History of Epidemic and Pestilential Diseases, with the Principal Phenomena of the Physical World which Precede and Accompany them, London, 1800.

Tourmouche.- On the Epidemic Influenza of 1837, Gaz. méd. de paris, 1847, p. 858.

Theophilus Thompson.- Annals of Influenza or Epidemic Catarrhal Fever in Great Britiain from 1510 to 1837, Lond., 1852.

Forget.- Gaz. méd. de Strassb, 1858.

Häser.- Historisch-pathol. Unters., i, 58.

Legrand.- On Influenza: Medical Aspects, etc., Paris, 1860.

H. van Holsbeck.- Influenza and Its Treatment, Ann. de la Soc. de Méd. d'Anvers, Jan., 1861.

Biermer.- Virchow's Handb.der spec.Path.u.Therap., Erlangen,1865,v,Pt.1,592.(A very exhaustive narrative.)
Corradi.- The Influenza or Epidemic Catarrhal Fever of 1580 in Italy,Milan,1866.
Hjaltelin.- Edin.Med.Jour.,May,1866.
Hall.- Epidem.Trans.Lond.,ii,Pt.1,1866,p.69.
Gèrard.- On the Contagiosity of Influenza,1866.
Vincent.- On the Different Forms of Influenza,xxxiv, p.4,Paris,1868.
C. Handfield Jones,- Brit.Med.Jour.,July 23,1870.
J. O. Webster.- Report of an Epidemic of Influenza,Bost. M. & S. Jour.,June 8,1871.
Gintrac.- New Dictionary of Practical Medicine and Surgery,T.xvi,p.728,Paris,1872.
Wolff.- On the Influenza Epidemic of 1889-92,Stuttgart, 1892.
Alex.Benedictus.- De Observatione in Pestilenzia Venetiis, 1493.Bonn,1516.
Valescus de Taranta,- Philonium, Venice,1523.
Most.- European Influenza,etc.,Hamburg,1820.
Gallicio.- Saggia sopra il Morbo detto Russo,Venice, 1782.
Simmons.- On Epidemic Catarrh,Frankfort,1788.
Richard Pearson.- Observations on the Present Epidemic of Catarrhal Fever and Influenza,Lond.,1803.
Benjamin Rush.- Medical Inquiries and Observations,Ed. 2,ii,353,Philad.,1805.
Marc d'Espine.- On the Influenza at Geneva in 1848, Gaz. méd.de Paris,iii,1848.
Pasquier.- Researches on Some Affections either almost Unknown or held to be due to Miasm,Paris, 1665.
Ripperger.- On Influenza,Munich,1892.
Pechlin.- Medical Observations,1691.
Riverius.- Opera Omnia medica,Lugd.,1669.
Villalba.- Epidemiologia Española,Madrid,1803.
Urerus.- Opera Omnia,Amsterd.,1660.
Livy.- Lib.iv,Cap.52.
Mercatus.- De Corporis humani affect.,Venice,1611.
Cognatus.- De Tiberis Inundatione;and Epidemia Romana, etc.,Rome,1599.
Thos.Molineux.- Philos.Trans.,xviii,Lond.,1695.
Lancisius.- Opera,Geneva,1718.
F. Hoffmann.- Opera omnia physico-medica,Geneva,1748.
Bianchi.- Historia hepatica,Geneva,1725.
Camerarius.- On the Epidemic Catarrhal Fever,etc.,Nuremberg,1715.
H. Pelargus.- Clinical Observations,Leip.,1738.
Perkins.- History of the Medical Society of Paris,i, 206,Paris,1776.
Medical Essays and Observations,published by a Society in Edinburgh,1750.
Réamur.- History of the Royal Academy of Sciences,Paris, 1733.
J. Pringle.- Observations on the Diseases of the Army, Lond.,1766.
J. Huxham.- Opera Physico-Medica,1784.
Thomas Hancock.- Art.Influenza,in the Cyclop.of the Prac. of Med.,Lond.,1833.

Parkes.- Reynolds's System of Med.,Vol.i,1868.
Aitken.- Practice of Med.,Vol.i,1872.
Thomas Short.- A General Chronological History of the Air,Weather,Meteors,etc.,Lond.,1749,- quoted in the Annals of Influenza.
Willis.- The Description of a Catarrhal Fever Epidemical in the Middle of the Spring in the Year 1658, Practice of Physic,1684.
Sydenham.- The Epidemic Coughs of the Year 1675,with the Pleurisy and Peripneumony that supervened.
John Huxham.- Observations on the Air and Epidemical Diseases,translated from the Latin,1758.
Thomas Berill Peacock.- On the Influenza or Epidemic Catarrhal Fever of 1847-48,1848.
Da Costa.- The Prevailing Epidemic of Influenza: Its Characteristic Phenomena,Pulmonary, Gastro-intestinal,Cerebral,and Nervous: Its Wide Distribution,Mortality,and Treatment, Med. & Surg.Reporter,Philad.,Mar.8,1879.
M. Geneau de Mussy.- Chir.méd.,Paris,1874.
Rogers.- On a Peculiar Type of Influenza-like Fever prevailing in Calcutta, Indian Med.Gaz.,1905, xl,407.
Pellet.- Some Reflections on the Rôle of the Grippal Element in Infectious Diseases, Lyon,1905.
A. Wilson.- A Case off Disjointed Personality after Influenza(Abstr.),Med.Press & Circ.,1906,N.S., lxxxi,224.
H. Beall.- Empyema due to the Influenza Bacillus, Jour. Amer.Med.Assoc.,1906,xlvi,1442.
Caulkins.- Remarks on La Grippe, Physic.& Surg.,1906, xxviii,118.
M. Dewar.- A Clinical Study of Influenza in the Epidemic 1904-5, Trans.Med.-Chir.Soc.Edin.,1905,N.S., xxiv,220.
Hunterian Society.- Discussion upon Influenza,published in the Transactions of the same,1905,102;129.
Booth and Williamson.- Acute Yellow Atrophy of the Liver following Influenza, Brit.Med.Jour.,1906,i, 1155.
S. Taylor(et al.).- A Discussion on Influenza, West. Lond.Med.Jour.,1906,xi,199.
Nason.- An Unusual Sequela of Influenza,Practitioner, 1905,lxxvi,687.
Nammack.- The Treatment of La Grippe, Med.Rec.,1906, lxx,988.
Voorhoeve.- Influenza, Zwolle,1906.
Ilyin.- Ulcerative Laryngitis in Influenza, Yehemïes, Ushu., Gorlov.,i,Nosov.,Bolïezn.,St.Pet., 1906,i,53.
C. J. Whitby.- Influenza and Local Immunity, Hospital, 1906-7,xli,207.
A. Woldert.- An Original Investigation of an Epidemic of Grippe,followed bya Large Number of Cases of Pneumonia:With Special Reference to the Infectious Nature of These Two Diseases, Med. Rec.,1906,lxxi,11.
Martha Wollstein.- The Influenza Bacillus in Inflammation of the Respiratory Tract in Infants, Jour. Exp.Med.,1906,viii,681.

T. C. Allbutt.- Influenza, Practitioner, 1907,lxxxviii, 1.
D. Armour.- Influenza and Appendicitis, Ibid.,62.
Blanchon.- Grippal Insomnia, Corresp.méd.,Paris,1907, xiii,No.296,4.
Sir W. Broadbent.- Note on the Therapeutics and Prophylaxis of Influenza by Quinine, Practitioner,1907, lxxxviii,13.
H. S. Brown.- Influenza and Epistaxis, Brit.Med.Jour., 1907,i.314.
Practitioner,1907,lxxxviii,124.- Bypaths of Medical History:Influenza in the Past.
A. H. Cheadle.- The Aural Complications of Influenza, Ibid.,1907,104.
J. Cowan.- Cardiac Complications of Influenza, Ibid., 67.
N. Dalton.- Influenza in Relation to the Digestive Organs,Ibid.,49.
J. S. C. Douglas.- A Case of Influenza Meningitis, Lancet, 1907,i,86.
Sir D. Duckworth.- A Note on a Possible Source of Influenza, Practitioner.,1907,lxxxviii,14.
W. d'E.Emery.- The Micro-organisms of Influenza,Ibid., 109.
J. Ferguson.- Influenza, Canad.Lancet,1906-7,xl,500.
W. Harris.- The Nervous System in Influenza, Practitioner, 1907,lxxxviii,70.
T. J. Horder.- Influenza Endocarditis With an Account of Two Cases in which the Influenza Bacillus was repeatedly cultivated from the Blood during Life, Med.-Chir.Trans.,1906,lxxxix, 333.
McCourt.- The Treatment of La Grippe, Med.Rec.,1907, lxxi,312.
H. Mackenzie.- The Respiratory Complications of Influenza, Practitioner,1907,lxxxviii,30.
Sir J. Moore.- Thoughts on Influenza, Ibid.,15.
A. Newsholme.- Influenza from a Public Health Stand-Point, Ibid.,118.
Sir D. Powell.- A Note on Some Clinical Aspects of Influenza,Ibid.,2.
T. C. Shaw.- The Psychoses of Influenza, Ibid.,86.
West.- Some General Considerations on Influenza, Ibid., 22.
St. C. Thomson.- Influenza as It affects the Nose and Throat, Ibid.,42.
Anna S. Wilner.- A Case of Paralysis of the Abducent Nerve following Influenza, Arch.Ped.,1907, xxiv,18.
Collins.- Influenza in Its Relation to Diseases of the Nervous System, Med.Rec.,1907,lxxi,337. (Discussion,370.)
Harris.- Influenza commencing with Sudden Unconsciousness and Excessive Dyspnoea, Brit.Med.Jour., 1907,i,562.
St.Barth.Hosp.Rep.,1907,xlii,192.- Influenza Endocarditis (2 Cases).
Jones and Turnley.- Influenza and Epistaxis, Brit.Med. Jour.,1907,i,562.

Maragliano.- The Typhoid Form of Influenza, Cron.d Clin. Med.,1907,xiii,33.
Oppenheimer.- Grippe from an Otological Standpoint, Amer.Jour.Surg.,1907,xxi,38.
Swayze.- Influenza and Some Treatment, Med.Times,1907, xxxv,36.
Waugh.- Asthma with Mixed Infection following repeated Attacks of La Grippe, Lancet-Clinic,1907, N. S.,lviii,205.
Freudenthal.- Nose and Throat Affections of Influenza, Therap.Med.,1907,i,57.
Heiman.- Influenza in Children, N.Y.State Jour.of Med., 1907,vii,147.
Davis.- Bacteriology of the Respiratory Tract,With Special Reference to Influenza Bacilli,Jour. Amer.Med.Assoc.,1907,xlviii,1563.
Graef.- The Eye and Ear Complications of Influenza, Med.Rec.,1907,lxxi,688.
Krall.- Severe Ocular Pain associated with Grippe, N.Y. Med.Jour.&c.,1907,lv,393.
Page.- Influenza ("Grip");Its Prevention and Natural Treatment;and Incidentally,a Study in Clothing, Med.Times,1907,xxxv,133.
Porter.- Influenza, Maritime Med.News,1907,xix,143.
Stearns.- Influenza: Complications of the Nervous System,with Treatment, Illin.Med.Jour.,1907,xi, 508.
Stumm.- Influenza, Jour.Minn.Med.Assoc.&c.,1907,xxvii, 177.
Brindel.- On Some Cases of Abscess of the Larynx of Grippal Origin, Rev.hebd.de Laryngol.,1907, i,613.
Lord.-Influenza, In Mod.Med.(Osler),1907,ii,469.
Manwaring and Ruh.- Intravascular Phagocytosis in Influenza, Jour.Amer.Med.Assoc.,1907,xlviii,1763.
Ferrier.- The Toxins of Influenza, Echo méd. d.Cévennes, 1907,359.
Pianori.- Myocarditis in Influenza, Gaz.d.Osp.,1907, xxviii,663.
Sersiron.- A Specific Cure for Influenza: Injections of Cacodylate of Guaiacol in Grippal Infections, Clinique,Paris,1907,ii,360.
Stonham.- An Anomalous Case of Influenza, Brit.Homoeop. Rev.,1907,i,259.
Erp.- The Treatment of Influenza, Indiana Med.Jour., 1907-8,xxvi,9.
Kaufmann.- Gastrointestinal Disturbances in Influenza, N. Y. Med.Jour.,&c.,1907,lxxxv,1210.
Rohmer.- Grippe and Accidents in Labour, Arch.d'Ophth., 1907,xxvii,353.
Preutt.- La Grippe in Chronic Form,Alab.Med.Jour.,1906 -7,xix,463.
Swanwick.- Special Points in Influenza, Med.Times & Hosp.Gaz.,1907,xxxv,434, 454.
Richards and Gurd.- Bronchiectasis with Bacillus Influenzae;Report of Two Cases, Montr.Med.Jour., 1907,xxxvi,541.
Rogan.- The Treatment of Influenza, N.Y.Med.Jour.,&c., 1907,406.
Albarran.- Grippal Cystitis, Rev.gén.de Clin.et de Thérap.,1907,xxi,594.

Sprigg.- Influenza Meningitis, Amer.Jour.Obstet.,1907, lvi,467.
Adams.- Grip Meningitis, Arch.Ped.,1907,xxiv,721.
Allen.- Gangrene of the Foot following Influenza, New Orl.Med. & Surg. Jour.,1907-8,lx,405.
Halford.- Epidemic Influenza, Australas.Med.Gaz.,1907, xxvi,449.
Schadle.- Membranous Laryngitis a Complication of Influenza, St.Paul Med.Jour.,1907,ix,692.
Shtshegoleff.- Clinical and Bacteriological Peculiarities of Influenza during the Spring of 1906,after Date from the Moscow Prison Hospital, Med.Obozr. 1907,lxviii,199.
Polanski.- Morbid Alterations and Complications in the Nose, Pharynx,Larynx,and Ear in Influenza, Gaz.Lek.,1907, S. 2,xxvii,951.
Batchelor.- The Epidemic Influenza, South African Med. Rec.,1907,v,273.
Halle.- Syncopal Form of Influenza in the Nursling, Bull.Soc.de Péd.,1907,ix,254.
Ausset.- The Treatment of Influenza in Children, Péd. Prat.,1907,v,282.
Bryant.- Influenza of the Nose,Throat,and Larynx, Med. Rec.,1908,lxii,48.
Decherd.- Pneumococcic Mastoiditis in the Recent Dallas La Grippe Epidemic, Texas State Jour.of Med.,1907-8, iii,237.
Simpson.- Influenza and Some of Its Complications,Louisv. Month.Jour.of Med.& Surg.,1907-8,xiv,233.
Stern.- The Renal Complications and Sequelae of Influenza,Med.Rec.,1908,lxxii,46.
Villani.- Influenza and Its Cure, Rassegna Med.,1907, xv,No.1, 3.
Coons.- Influenza:Pathology,Diagnosis,and Prognosis, Columbus Med.Jour.,1907,xxxi,533.
Fischer.- Influenza: Gastric Type;Respiratory Type, Pediatrics,1908,xx,1.
Leclerc.- La Grippe, Bull.méd.,1907-8,ix,145.
Lisle.- Influenza:History and Etiology, Columbus Med. Jour.,1907,xxxi,529.
Rankin.- Influenza:Treatment, Ibid.,536.
Anders.- Influenza and Weather Instability, Amer.Med., 1908, N. S., iii,26.
Burgmann.- Influenza in Children, Pediatrics,1908,xx, 145.
Dunn.- Influenza and Its Treatment, Ibid.,137.
Freeman.- Some Surgical Sequelae of Influenza, Denver Med.Times,&c.,1907-8,xxxvii,324.
C. Graef.- Nose and Throat Conditions in Influenza, Pediatrics,1908,xx,158.
Levy.- Throat,Nose,and Ear Complications of Grippe, Denver Med.Times,&c.,1907-8,xxvii,318.
Libby.- Eye Complications of La Grippe, Ibid.,317.
Rae.- Some Remarks on the Ear in Influenza, Pediatrics, 1908,xx,149.
Rover.- Symptoms and Diagnosis of La Grippe, Denv.Med. Times,&c.,1907-8,xxvii,313.
Sajons.- The Therapeutics of Diseases which involve the Internal Secretions;Influenza:Its Pathogenesis and Treatment, Month.Cycl.Pract.Med., 1908,xxii,20-27.

Springthorpe.- Influenza:A Retrospect, Intercol.Med. Jour.,1907, xii,637.
Stuart.- Cases of Influenza Meningitis, Wash.Med.Ann., 1908,vii,1.
Lancet,1908,i,352.- The Ventilation of the House of Commons and Influenza.
Arthaud.- On the Frequency of Cardiac Ulcerations in Influenza, Compt.Rend.,Acad.de Sci.,Paris, 1908,cxlvi,370.
Doble.- Note on a Case of Post-influenzal Pericarditis, Lancet,1908,i,1007.
Marmonstein.- Contribution to the Study of Grippal Aortitis, Rev.méd.,1908,xxviii,267.
Nash.- A Diagnostic Sign of Influenza, Lancet,1908,i, 1032.
Rimbaud.- Post-grippal Polyneuritis, Prov.Méd.,1908, xix,87.
Speigelberg.- Influenza,Dis.Child.,English Translation, Lond.,1908,ii,450.
H. Stern.- Influenza and Glycosuria, Amer.Med.,1908, N. S.,iii,105.
Bardes.- The After Effects of Grip, Dietet.& Hyg.Gaz., 1908,xxiv,266.
Bentz and Frye.- Influenza Septicaemia, Woman's Med. Jour.,1908,xviii,73.
Coakley.- Throat and Sinus Complications of Grip, N. Y. State Jour.of Med.,1908,viii,192.
Cohoe.- A Case of Influenza Meningitis, Johns Hopk.Hosp. Bull.,1905,xix,147.
Dench.- The Aural Complications of Grip, N. Y. State Jour.of Med.,1908,viii,193.
Evoli.- An Uncommon Form of Acute Influenzal Cardiopathy, Tommasi,Napoli,1907,ii,656-658.
Fritzche.- On Catarrhal and Aphthous Stomatitis in Influenza, Deut.Monat.f.Zahnh.,Berlin,1908, xxvi,299.
C. H. Jones.- The Grip in Baltimore, New Y. State Jour. of Med.,1908,viii,191.
Parker.- Concerning the Complications and Sequelae of Influenza, Old Dominion Jour.of Med. & Surg., 1907-8, vi, 576; and Richmond Jour. Pract., 1908,xxii,61.
S. S. Adams.- Grip Meningitis, Trans.Amer.Ped.Soc., 1907-8, xix, 144 (Discussion,155).
Böhm.- On Influenza, Arch.f.Phys.-diätet.Therap.,1908, x,142.
Brown.- The Psychoses of Influenza, Scot.Med.& Surg. Jour.,1908,xxii,509-513.
Gill.- Therapeutics of Influenza,Illin.Med.Jour.,1908, xiii,440.
Moustakas.- Grippal Optic Neuritis, Rev.d'Ophthal.,1908, S. 3, xxx,163.
Mygge.- Contribution to the Epidemiology of Influenza, Ugeskr.f.Laeger,Kjobenh.,1908,lxx,177; 209-246.
Vilardebó.- Prolonged Grippal Croup; Imminent Asphyxia; Cure without Operation, Med.de los Niños, Barcelona,1907,ix,59.

Brindel.- Grippal Sinusitis, Arch.Internat.de Laryngol., &c.,1908,xxv,1050.
Nelson.- Influenza Pneumonia, Charlotte Med.Jour.,1908, xxxii,339.
Sablè.- On the Pain in Grippal Polyneuritis, Jour.de Sci.mèd.de Lille,1908,i,368.
Saundby.- An Address on Cerebral Influenza, Brit.Med. Jour.,1908,i,1341.
Stiles.- Influenza:Its Diagnosis from a Morphological Standpoint in Stained Specimens of Sputum, Med.Rec.,1908,lxxiii,1065.
Loughlen.- Unhealthy Tonsils the Cause of Grip, New Y. State Jour.of Med.,1908,viii,418.
Trètop.- Paresis of the Vocal Cords in Influenza, Rev. hebd.de Laryngol.,&c.,1908,ii,245.
Davis.- Influenza and Influenzal Pneumonia,Their Etiology and Complications and the Occurrence of Influenza Bacilli in Various Infectious Diseases, Arch. Inst. Med., 1908, xvii, 407 - 414.
Harris.- Influenza in Its Relation to the Ear, Post-Graduate, 1908, xxviii,806.
Deleito.- The Cardiovascular Complications of Influenza, Clin. Mod.,1908,xvii,407.

CASE-HISTORIES.

Case 1.

This patient, who was over eighty years of age, was one day seized with chilliness and cough from which he suffered for a week, at the end of which time he complained of very severe headache, enteralgia, and anorexia. This state continued for three weeks, when he suddenly developed aphasia, word-deafness, and paresis of the right side of the body. The upper eyelids were paralysed, and the patient kept the eyes constantly closed. The word-deafness was, however, intermittent, and the closure of the eyes lasted for several days. There was obstinate constipation. For three weeks the patient remained in a more or less apathetic condition. Then the appetite returned, but the constipation persisted. The whole of the right upper extremity, with the exception of the fingers, remained powerless. The leg on the same side could only be dragged in the attempt at walking, but such attempts could not be long sustained. The left side presented no abnormalities. The eyes presented a condition of considerable epiphora. Speech never perfectly returned.

Case 2.

This patient was a lady of sixty years, who had chronic albuminuria, but was otherwise in tolerably good health; she had an ordinary attack of influenza, but suddenly in the course thereof developed right hemiplegia ushered in by severe headache. Two days afterwards, there was a prolapse of the right upper eyelid, followed by paralysis of the left one twenty-four hours afterwards. The next day the patient passed into a comatose condition, in the midst of which she died. The cerebral disturbances with ophthalmoplegia, which occurred so unexpectedly in this patient, were probably not due to uraemic manifestations, but rather to a polioencephalitis, the renal trouble being merely a predisposing cause.

---Case 3.---

This patient was a female of twenty-three years of age, who had for some days suffered from an obstinate and painful headache, with some impairment of the intellectual faculties. The general influenzal nervous symptoms in this case somewhat suggested a neurasthenic condition. The patient remained in bed in a state of indifference to her surroundings, and the condition of her eyes was particularly interesting, there being noticed recent strabismus, paresis of the upper eyelids, and a marked impairment of the vision. The patient could give only monosyllabic answers to questions. After a few days the patient died in a comatose condition. The patient seemed to have had no neurotic ancestors, and her previous health had been eminently satisfactory.

---Case 4.---

This patient was about fifty years of age, had previously enjoyed good health, and was neither alcoholic nor syphilitic. He suffered from an influenza characterised by severe headache, loss of appetite, and melancholia. General pains, somewhat trivial at first, became so violent in a few days that they were almost unbearable - particularly in the right side and suborbital regions, as well as over the temples, with radiations over the entire right side of the body up to the neck. They exhibited a certain amount of periodicity, being more severe in the afternoon, thereafter becoming continuous. At the same time the lower eyelid exhibited a tendency to prolapse, and the right eye was affected with strabismus. Vision on this side became impaired, and spasmodic phenomena were observed in the muscles of the right side of the face. By the end of another week the patient had become so weak as to be unable to leave his bed, he refused to partake of food, and manifested considerable pyrexia. Two days afterwards, the right eyelid was found to be red and oedematous, with the latter condition also apparent in the oculopalpebral conjunctiva, and the right eye ina state of tearfulness and injection. The next day the left eye was observed to be in the same condition. The patient was now prostrate; he responded, however to questions, and said that he now felt no pain. The general condition became aggravated that afternoon, and he died the following evening.

Case 5.

This patient was little boy of six years, who suffered from an influenza attack, characterised by severe headache, prostration, pains in the body generally, and a violent cough. There was great restlessness at night, and the eyes were so swollen and painful as to require the application of cold compresses. Cough was very obstinate, and the appetite was considerably impaired. Four days afterwards, the patient seemed much better, and played in bed and partook of a satisfactory amount of nourishment, but the cough continued and the sleep was much disturbed. Three weeks after the commencement of his illness, he unexpectedly vomited his dinner, had a slight haemorrhage from the nose, and developed high temperature. The next day, after a sleepless night, the pyrexial condition underwent aggravation, and the patient complained bitterly of his head. Cold water compresses were forthwith applied to the head and counterirritants to the lower limbs. There being a certain amount of gastrointestinal catarrh, it was thought necessary to give a dose of castor-oil. The temperature rose still further the following days, and the pulse attained 120. Curiously, the cough now disappeared, and the increase of the pyrexia was marked by the occurrence of convulsions accompanied by delirium. Kernig's sign was observed, and the symptoms of meningitis were observed. The patient was extremely restless, and could not remain longer than fifteen minutes in the same position. He required continual supervision and nursing. The febrile condition lasted nine days, and the constipation was most obstinate. The flexed limbs were the seat of excruciating pains, which the usual remedies failed to relieve. On the ninth day of the pyrexia the patient seemed to take a turn for the better, but the legs and right arm remained powerless. Post-influenzal paralysis seemed to be the nature of the existing condition, of polioencephalic origination. The child manifested hemiplegia and paraplegia. The face was paralysed on the right side, but there was no ptosis, inequality of the pupils, nor epiphora. The right arm could not be raised into the horizontal position; the muscles of the hand had preserved their contractility, and the patient could easily move the fingers. The lower limbs are paralysed, but the right one more than the left. That is not surprising, since the right lower extremity is doubly paralysed by both a cerebral and a medullary lesion. The reflexes were abolished,

sensibility normal,however.Mental condition unimpaired.Iodide of potassium prescribed,as well as galvanism and warm baths.The galvanism was of little or no benefit at first, though afterwards it relieved the paralytic conditions,particularly in the face and right arm.The patient ultimately recovered.

Case 6.

This patient was a young woman who had an attack of influenza that was particularly characterised by the violence and severity of the coughing attacks, as well as their frequency; this in time produced considerable debilitation.Examination of the chest revealed the existence of a generalised bronchitis, with numerous areas of congestion of the lungs at the bases.There was also present a severe rhinitis,with a marked conjunctival catarrh.There was likewise a considerable amount of headache,and the loss of appetite was extreme.The temperature rose to 101.5.F.,and there was inability to sleep. The heart,liver and spleen were normal.The patient felt so weak in the legs that she found it almost impossible to take a step forward.After some days of amelioration of all the symptoms, with the exception of the abundant expectoration and the nasal and ocular catarrh, the cephalalgia reappeared. The weakness of the lower limbs became so great that the patient found it impossible to stand for any time on her feet.Sensibility to heat and pain were preserved in the paralysed members.For twenty days from the commencement of the illness the intelligence of the patient remained unimpaired,but from now until her death a fortnight later the patient remained in a delirious condition with occasional intervals of consciousness.A bilateral ophthalmoplegia developed,and two days later there was absolute blindness. Ophthalmoscopic examination showed that the interior of the eye was normal,so that a paralysis of central origin and a polioencephalitis were suspected.Convulsions, at first partial and then general,now developed,and there was obstinate constipation.Frequent examination of the urine revealed no abnormalities,even to the time of her death.

Case 7.

This patient, a man of forty-seven years of age,had formerly suffered from syphilis. His influenza attack was of somewhat unusual severity - there being pulmonary

complications, with high fever and ocular troubles. Diplopia, strabismus, visual impairment and paresis of the upper eyelids were observed. Poliencephalitis of influenzal origination was diagnosed - the antecedent syphilis acting by way of predisposition to the same. The patient ultimately recovered.

Case 8.

This patient was a little girl of eleven years, who suffered from the nervous form of influenza - the attack culminating in double ptosis and paralysis of the facial muscles on both sides. There were no cerebral complications, and the patient made a satisfactory recovery.

Case 9.

This woman, aged twenty-four years, had recently been confined; but on the fifth day of the puerperium was suddenly seized with acute disturbance consisting of high fever, dyspnoea, cerebral excitation, and profuse sweats, together with inflammation of the cervical lymphatic glands running along the sterno-mastoid muscle on the left side. Here there was a considerable amount of redness, marked swelling, with pain, the latter being particularly severe on movement of the neck. This adenitis had been preceded, some days before, by by a comparatively simple angina, of which there now remained no trace. It is interesting to note that five members of the same family developed simultaneously similar affections, though in much lesser severity. The severity of the grippal intoxication was confirmed by the detection of a high degree of albuminuria. The following day the glandular troubles disappeared, but the patient speedily developed uraemic convulsive phenomena., and she succumbed to acute septic nephritis.

Case 10.

This patient was a middle-aged workman of good antecedents, who-up to the time of his influenza attack, had enjoyed good health. One day he returned from work with an excruciating headache and agonising pain in the loins and limbs. He was obliged to stay indoors, though not in bed, for four days, when he felt considerably better and appeared to be convalescing favourably. Early in the evening of the fourth day he had a shivering fit, coughed a good deal, experienced a dull aching pain in the left side of the chest, and was generally uneasy. He sat close to the fire, had

a flushed face,and was breathing rapidly.He had a severe cough and raised very small quantities of a very viscid and tenacious mucus,which was not stained with blood.The pulse was accelerated and somewhat feeble,but not irregular;the heart's action was a little laboured,and its sounds were muffled.Examination of the chest revealed a fairly good movement on the left side just below the angle of the scapula, and over this spot there was some impaired resonance with increase of vocal resonance and some fine crackling râles.There was a certain amount of pain,but not intense,in the side on movement.The bowels were moved spontaneously,the tongue was dry,anorexia was present,the urine was high-coloured and was not voided so often as usual.Warm applications were prescribed to the chest,and the patient was given a mixture of citrate of potash,spirits of nitrous ether,nux vomica,and chloroform-water.Barley-water was allowed in any quantity desired,and milk was administered in liberal doses.He was seen the next day; he had passed a fairly good night,but the cough was very hard and exhausting,and heroin and terpene hydrate were forthwith prescribed.The heart's action was somewhat more satisfactory, but the sounds were rather feeble.The physical examination of the chest revealed nothing new.The next day the patient complained bitterly of the severity of the cough,though he admitted that it was a trifle looser; the sputum is somewhat less tenacious and a little darker in colour,but not typically rusty.The heart's action is about the same,so tincture of digitalis was added,in five-minim doses,to the above-mentioned mixture.The appetite is still poor.He has passed more urine the last two days,and the tongue is now a little cleaner.The bowels are naturally open. The following day it was ascertained that he had passed a fairish night,but that the cough troubled him considerably on waking.The pain in the side is easier.The heart's action is better - so much so that the digitalis was withheld.The condition of the lung remains the same.The urine is more copious,the tongue is more moist,and the patient is able to partake of nourishment with more avidity than heretofore. The next day the cough was looser and less frequent,and his night's rest had been better than usual.The skin is more moist,and the heart's action has improved.The following day the patient's condition was much about the same,and he complains of much weakness.The next day,the first of the month, he did not seem to be so well,and he complained of feeling even weaker than yesterday.Pulse feeble and rapid.Tongue

rather dry.Much restlessness was experienced during the night. Drachm doses of brandy were ordered for administration every hour,and the digitalis was resumed.The patient is still unable to expectorate.On the 2nd,it was ascertained that he had had a restless night and was delirious at times.The cough is very troublesome,but no sputum is raised.He was ordered a mixture of ammonium carbonate,ipecacuanha,tincture of digitalis,and chloroform-water for administration every three hours, and drachm doses of brandy were still continued every hour in hot milk.The condition of the lung is unchanged as regards the area of consolidation,but numerous râles are audible all over the base of the organ.The skin is very dry.The next day he was reported to have had a better night,and he seems now to be much more comfortable.The cough is looser,and the patient is able to raise a certain amount of sputum.The latter is now frothy and not dark in colour.The tongue is more moist;and the patient,though still weak,is undoubtedly improved.The heart's action is less feeble,and its sounds are more satisfactory.The lung is beginning to clear up a little,but there are numerous crepitant râles to be heard.Thr brandy and digigalis stopped.The following day the patient was still better, but is unable to sit up in bed without feeling faint.He was ordered,three times a day, a mixture of tincture of nux vomica and bicarbonate of soda in chloroform-water.From now the general improvement was maintained,and the patient returned to work after an uneventful convalescence.

Case 11.

This patient was woman verging on sixty years of age,who four years ago had an attack of acute bronchitis of several weeks'duration, subsequent to which she had periodical attacks of winter cough.The present illness commenced about ten days ago with an attack of influenza which left behind it a very troublesome cough,which was worse at night.She was getting up daily,but did not go out of doors.Three days ago she complained of pain in the left side, but attributed it to the severe cough.There was no sputum,and she had no definite rigor.She now became gradually worse;and on the evening of the tenth day she was found to be sitting up in bed with a flushed face,very laboured breathing,and a hot and dry skin. She had a constant hard cough;she could scarcely speak for it;and she occasionally brought up a small piece of thick viscid sputum,which was not stained with blood.Examination

of the chest revealed slight dulness over the left lower lobe, some impaired movement, and increased vocal fremitus. There was harsh breathing, and a few crepitant râles were audible. The heart's action was somewhat laboured, but quite regular, and the pulse was somewhat feeble. The tongue was dry and coated, and the bowels had been constipated. The urine was scanty and high-coloured, and contained a trace of albumin. The chest was ordered to be poulticed; calomel and a saline were prescribed, and the patient was also given a mixture, every three hours, of ammonium carbonate, ipecacuanha wine, spirits of nitrous ether, tincture of strophanthus, and chloroform-water, as well as an occasional teaspoonful of the heroin and terpene hydrate mixture. The following night was very unsatisfactory, owing to the troublesome cough, but the sputum was more freely raised and was slightly rusty. The pain in the side is easier, but is still severe at times. The heart's action is still somewhat feeble. Consolidation of the lung more obvious. Tongue cleaner, but still dry. The next day it eas found that the patient had had a few hours of sleep during the night; she was very restless, however, and once or twice slightly delirious. Still, she feels better. The skin is somewhat moist, and the heart's action is more satisfactory. The cough is very troublesome at times, but decidedly looser. During the night of the 17th, she slept fairly well, but coughed very much on wakening in the morning - a feeling of exhaustion being experienced. She perspired a little. Tongue somewhat improved, and the lung appears to be in a state of resolution. The next night was even better; she was able to lie down at times without difficulty, but prefers to be propped up in bed. The heart's action is not quite so good. Breathing easier, and the cough much looser. The next day she seemed still more improved, and the temperature was normal for the first time. From now she convalesced satifactorily, and she recovered perfectly in due course.

Case 12.

This patient was a workingman, turned forty years, who, when first seen, was found to be suffering from influenza with acute bronchitis. His past history was satisfactory. He appeared to progress properly; but three days afterwards he contrated a chill, and on the evening of the 25th, he was found in bed complaining of dyspnoea, pyrexia, and severe and frequent rigors. His cough, which the previous day had

occasioned him little or no inconvenience, had been since the middle of today very excessive and painful. The pain on coughing was referred to the whole of the left side of the chest, and down the inner side of the left arm; he raised some clear and frothy mucopurulent sputum. He had all the appearances of an individual suffering from acute pneumonic inflammation. His respirations were 41, his pulse 120, and his temperature 103.2. F. Inspection and palpation of the chest revealed nothing abnormal, except rapidity and shallowness of breathing. Friction fremitus over left lower lobe quite distinct. Percussion over the left side of the chest showed no difference in the resonance as compared with the right side. On auscultation, loud rhonchi were audible all over the chest; pleural friction, diminished respiratory murmur, with distinct tubular breathing, were clearly audible over the basal portion of the left lower lobe, from the seventh intercostal space to the lower border of the left lung behind. The heart presented no abnormalities. The abdominal wall was generally distended and highly tympanitic on light percussion. There was severe pain in this region on coughing, as well as over the epigastrium and left hypochondriac regions. Hepatic dulness was normal, but the skin seemed slightly jaundiced. The next day the patient's pulse was 126, the respirations 42, and the temperature 102.8. F. He had had a fairly good night; but he was troubled with vomiting, which he referred to a dietetic indiscretion the previous evening. There was generally no change in his condition; the sputum was more viscid than before, and the pleuritic pain was just as severe. The treatment was continued, but peptonised milk was added to the dietary. In the evening the pulse, temperature and respirations were about the same; the vomiting had diminished very much since the diet was rearranged, though the tongue was still coated with a thin moist fur. The abdominal distension was less, but abdominal and thoracic pain were still severe during the paroxysms of coughing. The next day the respirations were 48, the pulse 124, and the temperature 102.5. F. The patient appears to have had a few short sleeps, being roused from each by the pain in his side during the attacks of coughing. The vomiting had all disappeared, but the peptonised milk and stimulants were continued. There was no change in the condition of the lungs, except for the clear tubular breathing in the lower third of the left axillary region. The sputum was now rusty, fairly plentiful and well aerated, though still tenacious; the specimen of the previous day was found to be teeming with diplococci. The pulse,

temperature and respiration were found to be much about the same in the evening,and there was practically no change in the patient's condition from the morning.He was allowed some chicken broth in addition to the peptonised milk,and codeine and tincture of strophanthus were exhibited.The next morning he had a pulse of 125, a temperature of 102.6.F.,and respirations of 44.The patient had had a very painful night,the cough being very frequent and disturbing his rest.Over the front of the left lung a few moist râles were audible,chiefly limited to the fourth and fifth left interspaces,being more plentiful in the lower part of the axilla.The dosage of the codeine mixture was increased by a half.The same evening the respirations were 46,the pulse was 127 and the temperature 103.F.He had had less cough since the increase in the dose of the mixture just mentioned.The bowels not having yet moved,after the enema,he was given two pills of aloin, podophylin,and extract of hyoscyamus.There was generally no change observed.The patient had a comparatively good night; but as the bowels had not moved the next morning,he was given an enema.This acted well;it appeared to benefit the patient considerably,though the cough or movement still produced much pain in the side.The mucous râles were now more plentiful,but still limited to the original area in which observed.The cardiac sounds were of good tone,and the pulmonary second sound was well accentuated.The respirations were 44,the pulse was 123 and the temperature 102.8.F.The same evening his condition was unchanged,though the temperature was elevated a fraction of a degree.The next morning the respiration was 42,the pulse 122,and the temperature 103.F.The patient had had a very poor night;the cough had been very troublesome at times,and greatly aggravated the pleural pain.He was expectorating very freely,an aerated and very rusty and sticky sputum being raised.The same evening the temperature was the same,but both the respirations and the pulse were elevated two points.The patient seemed to be bearing his illness with remarkable fortitude. The condition of the lungs showed no change.The next morning the pulse and temperature and respirations were down a point.The patient had had a very fair night,though he slept but little.The lungs showed more generalised catarrh; a few râles,of a medium crepitant variety,were clearly audible now all over the left lung;but no definite resonance as compared with the right side was noted,nor any increase in the areas of the tubular breathing.The same evening the

temperature, pulse and respiration had undergone no change. The pulmonary second sound still retained its clear accentuation, the pulse was equally full, and there were no signs of dicrotism present. The next day the respiration-rate was 39, the pulse 105, and the temperature 100.2.F. The patient seemed and felt better. The sputum was unaltered, the respiratory sounds were the same as before. The urine remained scanty and thick. The patient was hungry and demanded to be fed. The tongue was still coated, but more moist, and the skin was the opposite of dry. The same evening the pulse was down two points, the respirations one point, and the temperature about the same. There was no appreciable change in the patient's condition from the morning, and paroxysms of coughing were still observed. The next day the patient was much worse - the respiration-rate being 40, the pulse 122, and the temperature 103.F. The sputum still remained unaltered, the skin was still moist with perspiration, the tongue was coated and more moist than formerly, and the circulatory phenomena were unchanged. The right lower lobe of the lung posteriorly, as high as the eighth rib, was decidedly duller than formerly; and on auscultation distinct fine crepitations were audible in it, but no bronchial or tubular breathing; elsehwere through the right lung loud rhonchi were still present. In the left lower lobe the crepitus redux was clearly audible, tubular breathing remained, and the mucous râles were plentiful above the areas of consolidation. The same evening the respiration-rate was the same, and the pulse and temperature showed only fractional elevations. There was clear bronchial breathing over the right lower lobe behind: otherwise the condition remained unchanged. The next day the respirations were down three points, the pulse eight points, and the temperature two degrees. The patient, after a restless night, had a fairly good sleep of nearly two hours' duration from about 6 to 8 a.m. On wakening he felt very much better, and his appetite had again returned. Moist râles were now audible over the lower part of the right axilla, but they were only few and far between as compared with the left side. The same evening the pulse was 102, the temperature 100.4.F. and the respirations 32. The patient was asleep when seen, and had been so for thirty minutes; he was simply bathed in perspiration. He was not disturbed. The next day the temperature was normal, the pulse was 89, and the respirations had fallen three points. He had passed a good night, and now felt comparatively well; the pain in the side, however, remained, but was

not so severe. Percussion of the posterior surface of the right lung showed diminished dulness over the original flat area. The bronchial character of the breathing was almost entirely removed and substituted by moist, medium and fiber râles, with more coarse ones and rhonchi above. On the posterior surface of the left lung bronchial breathing still remained, together with moist râles over the area originally affected. Moist râles and rhonchi were distributed through the whole of the rest of the left lung. The pain was referred as formerly to the area of the lung affected, and over the left hypochondriac region it was still severe. The sputum was more aerated, still rusty, but more liquid. The urine was more abundant, but still loaded with urates. The next day the pulse and temperature and the respirations were about normal. The patient had had a very good night, sleeping frequently for long periods on end. He perspired freely during the night; he feels his cough easier than hitherto, but still complains of a stitch in the lower part of the left axilla, this being not easily located and intensified by change of position. His appetite and gastric condition are saitsfactory. The bowels have moved of their own accord. The sputum is frothy, mucopurulent, aerated, and contains pneumococci. The heart appears to be normal. The right lung is now clearing up, the dulness is surely and rapidly disappearing, and bronchial breathing is still faintly audible; but what one principally hears is the mucous râles - not so plentiful as before - and the dry rhonchi of general distribution. Bronchial breathing is still clearly audible in the left lung with the moist râles; above the affected area the latter are fewer, but the rhonchi remain unaltered. The next morning the pulse, temperature and respirations were normal. The patient appears to be making slow and steady progress. The right lower lobe posteriorly is free from dulness on percussion; no bronchial breathing is audible anywhere; the moist râles are limited to the lower third of the lower lobe; the rhonchi are fewer, but still present. With the exception of the rhonchi, the upper portion of the lower lobe and upper lobes are now clear of râles. The conditions in the left lung have become coincidently modified above the area originally affected. The upper portion of the lower lobe is now clearing of dulness and is freer from râles; and the same applies, but more forcibly, to the upper left lobe. The affected area of consolidation, from the scapular angle to the lower border of the lung, is still dull, with marked vocal fremitus, increased vocal resonance, no whispering pectoriloquy, clear

bronchial breathing not at all diminishing, and some mucous rales also present in the upper portion of this area, especially towards the front and axillary regions. The same evening the temperature was 100.F., the respirations 28, and the pulse 85. The next morning these figures were respectively 99.6.F., 26, and 80. The patient now seemed to be making marked progress, but not so satisfactorily so as one would expect in such a strong and previously healthy individual. The pain in the left side is not diminishing, and he still coughs and raises mucopurulent germ-bearing sputum. It was considered advisable, in view of the possibility of complications, to make and exploratory puncture with a hypodermic needle, but no effusion was found in either pleural cavity, and the results of percussion to this end were negative. The same evening the temperature was 100.2.F., the respirations 28, and the pulse 80. He was allowed up out of bed. The next morning the temperature, pulse, and respiration were each down a point. There was no change in the left lower lobe. The upper part of the left lung above the angle of the scapula was almost clear of adventitious sounds. A few dry râles were audible over the larger bronchi. The right lung was now clear of all adventitious sounds. The sputum remains the same, a sample containing pneumococci, but no tubercle bacilli. The urine is normal. Tincture of iodine is being painted on the affected area every day. The next day the patient was seen to be going about. He still has the pain in the side and the sputum is no different. The affected area likewise preserves its dulness, but more moist râles, of a fine and medium character, are clearly audible. The following day the temperature was found to be about normal, and slowly declining. The respirations are from 26 to 20, any slight exertion forthwith occasioning a dyspnoeic condition, though this tendency appears to be becoming less and less evident. The pulse-rate varies from 89 to 78. The cough and sputum and lateral pain are just the same as ever. The left lung behind the scapular angle is still dull, vocal fremitus is exaggerated, vocal resonance is still increased, tubular breathing is decidedly less, the mucous rales are very plentiful, and of a medium and coarse character. The dry ones over the large bronchi are still in evidence. The patient now went away for a short holiday; and on his return it was observed that the dyspnoea on exertion was still present, though less. He has not so much pain; he notices that it goes away in the event of his exerting himself, and becomes somewhat severe in the evening; it is induced by perspiration, yawning or sneezing -

more than by the gradually disappearing coughing spells. The temperature, pulse and respiration are now normal. The only peculiarity now in the upper lobe is diminished respiratory movement, slight dulness as compared with the other side, and a few dry and moist râles. He now made an uninterrupted recovery and was back at work in a few weeks.

Case 13.

This patient was a carman, aged forty-two years, who had always been a total abstainer and a moderate consumer of tobacco. He had never been very strong physically, but never appears to have had any serious illness, apart from what seems to have been occasional attacks of tuberculous glands in the neck. He had an ordinary attack of influenza, and committed the indiscretion of returning to his work after a week's illness only. He now lost his appetite completely, complained of chilliness, inability to sleep, and headache; he had forthwith to give up work on account of shortness of breath and a frequent short cough, with pain in the left side passing down over the liver to the front of the abdomen. When seen, he was sitting in a chair near the fire, as he found that position more to his liking than bed. His face was flushed, there were no signs of dyspnoea, and perspiration bathed his forehead. The tongue was coated with a thick whitish fur, but the throat showed no abnormalities. The pulse was 112, and full and bounding as in febrile conditions. The temperature was 103. F. The respirations were 40 per minute, with a peculiar short pause and cough at the end of each inspiration. Palpation over the right lower six ribs posteriorly elicited during inspiration, especially when the cough occurred, distinct friction fremitus. Elsewhere palpation failed to detect any rubbing. Vocal fremitus over the same region behind and laterally on the right side was increased. On percussion there was dulness, extending from the fifth rib on the right side, present behind and laterally, nothing abnormal elsewhere being noted. On auscultation bronchial breathing was clearly audible on the right side from the fifth rib behind downwards to the eleventh interspace, and in the axillary region from the fifth rib downwards. Friction sounds were also very clearly distinguishable over the sound area. The heart presented no abnormalities. There was slight abdominal distension; the bowels were constipated, not having been moved since the previous morning under the influence of castor-oil.

There was some pain in the right hypochondriac region, and slight tenderness as well. The liver dulness was normal in extent. No enteric symptoms were observed. There were no disturbances in the limbs. The urine was high-coloured and clear; in amount it was scanty, contained no albumin and no sugar, and was deficient in chlorides. The sputum was yellowish and very tenacious; it contained diplococci. The condition was evidently that of acute lobar pneumonia affecting the right lower lobe. The past history of the patient, his correct mode of living, his abstemious habits, and his open-air life and freedom from complications all indicated a favourable termination. The mouth having been neglected, a wash was ordered for use three times a day. He was sent to bed, and mustard poultices were applied to the affected area to reduce the pain complained of. A light diet was recommended. He was given every four hours a mixture containing heroin hydrochloride, in gr. 1/16 doses; and powders of gr. v. phenacetine were prescribed. The same evening there was no change in the patient's condition and physical signs, though the phenacetine was probably the means of reducing the temperature a little, allaying the headache somewhat, and producing some sleep. The next morning he had a pulse of 110, a temperature of 102.5. F., and a respiration-rate of 41. He seems to have passed a good night. The cough was not very irritable, the pleuritic pain was less severe. The tongue was more coated, but the rest of the buccal cavity was clean. Herpetic spots were observed upon the lips, as well as under the right nostril. On auscultation in the right middle lobe of the lung revealed was the presence of moist medium crepitation, but otherwise there were no changes in the pulmonary physical signs. The cardiac sounds were well accentuated, especially the pulmonary second sound. The phenacetine powder was repeated once today, on account of a return of the headache, and an aperient pill was given along with it. The same evening the temperature was 103. F., the pulse 112, and the respiration-rate 41. The physical signs remained the same. The next morning these figures were slightly raised. There were no changes in the physical signs, and the other conditions remained as yesterday. The same evrning the temperature was as on the previous evening, the respiration-rate was up a point, and the pulse also. The bowels moved in the afternoon. The patient slept a little during the early part of the evening following the action of the bowels. The moist râles in the middle lobe of the right lung are more abundant, and there are also some in the upper lobe as well; percussion over the middle

lobe is decidedly dull.The next morning the temperature was 103.5.F.,the respiration-rate 41,and the pulse 114. The patient had had a fairly good night:he slept at times for periods of half an hour,and during sleep he was delirious.The symptoms and signs remained unaltered from yesterday.The same evening the temperature was the same,the pulse 116,and the respiration-rate 42.The patient was very uneasy with the cough at one part of the afternoon,though this was relieved by a change of position.The physical signs in the middle and upper lobes are unchanged.He was given a tepid sponging.The next morning the pulse,temperature,and respirations were the same as on the previous morning.The physical signs were unaltered. He appears to have slept a little after the sponging.An aperient pill was again administered,and he was prescribed ten minims of the tincture of strophanthus every four hours.The same evening the pulse was up a point,but the respirations and the temperature were unaltered.The moist râles were very plentiful in the upper lobe of the right lung,but the degree of dulness in the middle lobe remains unchanged.The next morning the pulse,temperature,and the respirations were the same. There are no apparent differences in the physical signs.The same evening the temperature,pulse and respirations exhibited no variations.The next morning early the bowels moved,and consequent upon a repetition of the sponging,he appears to have passed a comfortable night.The temperature was now 103. F.,the pulse 112,and the respiration-rate 42.The same evening the cough was observed to be looser,and the sputum not so tenacious.The skin is,and has been,moist all along.Very fine crepitations (crepitus redux) are observed in the axillary portion of the right lower lobe.On percussion the area over the middle lobe is seen to be complete dull;the upper lobe is still resonant,and equally so with the opposite side. Auscultation of the middle lobe shows bronchial breathing in its lower part,and a preponderance of moist fine râles above with medium-sized onesTemperature 103.2.F.,pulse 116,respirations 42.The patient passed a restless night,being delirious all the time;in the morning the cardiac sounds were still highly accentuated,and the apex beat displaced.The crepitus redux was more distinct.Temperature 103.F.,pulse 115,respirations 42.The physical signs were unchanged.The next morning the patient's condition was the same.Strychnine hydrochlorate,gr.1/20,was injected every six hours for the prevrntion of heart failure.The same evening,temperature 102.2.F.,pulse

109, respirations 40. There were signs of crepitus redux all over the lower pulmonary lobe on the right side, and larger crepitations in the lower limits of the lobe. The next morning the temperature was normal, the pulse 63, and the respiration-rate 24. The entire aspect of the case was altered: the crisis had evidently occurred, the patient had slept during the early morning and passed plenty of urine. The middle lobe was full of moist râles above of medium size; below fine crepitations prevailed; the upper lobe was full of coarse moist râles; and the lower lobe contained moist medium râles with finer crepitations intermingled. The next day the strychnine injections were discontinued, the temperature and pulse were normal, and the respirations were 22. The middle lobe was not absolutely dull on percussion, and in it no bronchial breathing was audible, the moist and coarse râles being so plentiful. The lower lobe was still quite dull: the crepitus redux had given place to coarser râles. A more liberal diet was now allowed. The next day the respiration-rate was 20. The upper lobe was clear of all the adventitious respiratory sounds. The middle lobe was still filled with moist râles, but was becoming more resonant daily. There were coarser râles in the upper lobe also, and diminished dulness on percussion was observed. The patient was now allowed to sit up a while. The next day the upper right lobe was found to be quite free from all adventitious sounds. The middle lobe is now freer from coarse râles, and its upper part shows chiefly pure vesicular breathing. The lower right lobe contains moist râles of all varieties, and in the axillary region a few dry rhonchi are observed during deep inspiration. The next day the middle lobe was quite resonant and almost free of adventitious sounds. The lower lobe behind contains, from the scapular spine to the fifth interspace, moist râles with vesicular respiration, the lower limits containing moist râles. The axillary region above on auscultation shows the presence of vesicular breathing and below the same condition with rhonchi and a few fine moist râles. The whole of the right lung, with the exception of the lower half of the right lower lobe, is resonant on percussion. The next day the patient was found to be much stronger, though pale; he sleeps well, and has absolutely no pain in the side; the respiration-rate is 18 per minute, but becomes increased on the slightest exertion. There is a slight mucous and mucopurulent expectoration. The right upper and middle lobes are now normal in their physical conditions. The lower lobe is

becoming more and more resonant, and only a few moist rales, in the lower limits posteriorly, are audible as adventitious sounds. From now the patient made an uninterrupted recovery, and was back to work in a few weeks.

Case 14.

This patient was a young unmarried woman who had, previous to the present influenza attack, enjoyed good health. This seizure was characterised by the occurrence of very severe headache, the usual grippal phenomena, to which was added a certain amount of deafness. She did not make a good recovery; she remained weak and melancholic, and had anorexia - this state of affairs continuing for a month, when she was prostrated for seven days with violent vomiting. About this time the patient observed that her urine was becoming scanty and turbid, and at the same time oedema appeared. The urine was bloody, and contained a small quantity of albumin, as might be expected from the acute nephritis present. After three weeks of the usual treatment for this condition she began to improve, the urine becoming more abundant; but in the meantime the patient died from sheer exhaustion after an illness of six weeks.

Case 15.

This patient was a boy at the age of puberty, who, after an influenza attack, suffered from weakness of the legs accompanied by paraesthesia and dull pains. At the end of the fifth week there suddenly occurred a total paraplegia, with loss of the patellar reflexes and sensibility to the level of the fifth interspace of the ribs. There were also noted constipation, bladder paralysis, continued erections, pyrexia, and severe darting pains in the arms. The loss of sensibility extended to two intercostal spaces higher up, and then stiffness of the neck appeared, together with paralysis of the arms and difficulty in breathing. Nutritional disturbances now appeared; and this state of affairs lasted for another weeks, when the symptoms all gradually disappeared under treatment directed against the existing spinal cord inflammation.

Case 16.

This patient was a little girl, nearly twelve years of age, who suffered from influenza, in the courde of which she complained of various symptoms, including intense headache and

excruciating neuralgia. Both legs became paralysed twenty-one days after the beginning of the grippal attack; and, in spite of her otherwise favourable progress, this paralytic condition remained. In the recumbent position the lower extremities could be moved only a little; and great pain in the ankles and soles of the feet was experienced as soon as she put her feet to the ground. The bowels and urine presented no abnormalities. About a month afterwards, the muscles of the legs seemed to harden somewhat, and the reflexes in those of the upper extremities underwent exaggeration. The patient was utterly unable to walk, though capable of moving her limbs in bed. It was scarcely possible to carry out passive movements on the muscles of the right side of the body, and the manoeuvre caused frequent tonic spasms in the left leg. The patellar tendon reflexes were greatly exaggerated also, clonic spasms being induced by tapping with the fingers. The legs were flexed at the hip when the patient was suspended by the armpits. The muscles of the limbs were not swollen, sensibility was preserved, and no pain was experienced in the nerves supplying the periphery of the body. The patient had a long and tedious convalescence, but ultimately recovered.

Case 17

This patient was a middle-aged woman of the working class, who for a fortnight suffered from a severe attack of the nervous form of influenza, she experiencing pyrexia, distressing cough, cephalalgia, angina, and great weakness in the lower extremities, followed by pain in the left thigh and swelling of the left arm. In addition to this, there were observed such symptoms as enteralgia, loss of appetite, diarrhoea, insomnia, restlessness, stupor, agoraphobia, delusions, and a great tendency to cry aloud. At this stage of the attack there was a temperature of 102. F., the pulse was exceedingly small, the pupils did not respond to the stimulation of light, the lips were dry, the tongue was coated with a thick fur, and the patient had a forlorn expression. The legs were flexed rigidly on the belly. She had diarrhoea unconsciously, and the urine contained albumin. There was no rigidity of the abdominal muscles. Bluish and red discolouration was observed in the arms, which were somewhat swollen. Signs of acute bronchopneumonia appeared in both lungs, and the usual symptoms of leptomeningitis occurred, in the midst of which the patient died.

Case 18.

This patient was a shopkeeper, just turned thirty years of age, who suddenly fell ill with influenza characterised by cephalalgia, severe cough, pyrexia, dyspepsia, prostration, and a considerable amount of continuous pain in the lower part of the spine. Within a week he felt considerably improved and had a fairly good appetite. He went out of doors, although forbidden to do so; and the next day he had intense nausea, vomiting, and a feeling of weight in the region of the stomach. The pyrexial condition had returned, and great uneasiness and retraction of the abdomen were observed. He was even worse the next day, and his mentation seemed obscured. Two days afterwards, stiffness of the neck was noted, and the pupils failed to respond to light as smartly as usual. The same evening the patient was unconscious and jerked his body about in bed. The respirations were accelerated, and they were accompanied by a snoring sound. The ocular muscles lacked their usual coordination, and the urine and faeces were voided unconsciously in bed. Physical examination of the chest revealed the usual phenomena of broncho-pneumonia. This condition of meningeal inflammation became gradually worse, and the patient succumbed on the evening of the third day.

Case 19.

This patient was an ummarried woman of twenty-seven years, engaged in domestic service, and of good family and personal history. She had an attack of the nervous form of influenza, from the effects of which she felt a peculiar loss of sensibility in the left arm and weakness of that member. In a few days this disappeared, though prostration, anorexia and increased debilitation remained. During the next fortnight she improved somewhat, but then experienced cephalalgia, sickness, and general disinclination for bodily or mental exertion. The next day loss of sensation again returned in the right arm, and was now accompanied by right hemiplegia, somnolence, vomiting, and general convulsions, which lasted for one hour and recurred from time to time. The patient was now unconscious; she could not be wakened up by shouting in her ear, but made a grimace when pricked with a needle. The face was cyanotic; the eyes were closed, and on separating the lids horizontal squint was noticed. The pupils were of medium

size,but did not react to light.The patient ground her teeth,and she occasionally sighed deeply,as well as yawned. There was continuous tossing of the body to and fro,with a tendency to lie upon the right side.The limbs were at first quite flaccid,but occasionally rigid.The patellar reflexes were exaggerated,and there was inability to hold the urine. Both the temperature and pulse were normal.An hour later the muscles of the face were spasmodically contracted,and the same alternate contractions and relaxations were observed in the legs on both sides.The pulse now became fuller and slower,and there was noisy breathing,as if the patient were under the influence of an anaesthetic.The next morning the convulsions recurred.The temperature now rose to fever-height.The ophthalmoscope showed that the veins of the choroid were markedly injected.Winking spasms and twitchings of the alae nasi were observed,and the vessels of the face were injected.Towards afternoon hyperpyrexia occurred,together with a small and rapid pulse and quickened respirations. The patient died in a few hours in a state of coma and exhaustion.

Case 20.

This patient was of the same age and circumstances as the foregoing,who suddenly developed influenza with a rigor. She at once had to take to her bed,and complained of cephalalgia with general uneasiness.She was very irritable and vomited frequently.In the evening the temperature rose to fever-height,and the patient became markedly apathetic;towards midnight she became unconscious and had a temperature of 104.F.She continued in this febrile comatose condition for four days,and then died,the cause of the decease being meningitis.

Case 21.

This patient,a young man approaching thirty years of age,contracted an ordinary attack of nervous influenza characterised by cephalalgia and the usual symptoms.On the fifth day the temperature fell to normal;but the next day he had a rigor,and experienced dizziness and severe vomiting.The same evening he was seen to have great paresis of the right facial,a slight one of the hypoglossus,and a paresis of the right upper extremity.He developed aphasia

somnolence. The next morning the temperature fell to normal; and the patient recovered within a fortnight, with none of the paralytic phenomena remaining.

Case 22.

This patient was a tradesman's assistant, who had an orinary attack of influenza. At the seventh day of the convalescence he developed an urticarial eruption, followed by paralysis of the muscles of the legs, which later extended over the body by the end of a fortnight. Paralysis of the facial muscles on the left side and difficulty in swallowing pointed to cranial-nerve involvement. The reflexes were abolished, and atrophies of muscles and trophic disturbances were observed. The paralysed parts were very tender to pressure. The patient made a perfect recovery in four weeks.

Case 23.

This patient was working man of the same age as the above, who had an ordinary attack of influenza; but at the seventh day developed formication and numbness in the ends of the fingers, as well as in the toes later; in addition to this, at the end of seven days, there were superadded weakness of the lower extremities and difficulty in deglutition. There was no rise of temperature; and the previous good history of the patient and his relations negatived predisposing influences. There was no disturbance of sensation, the pupils were unaffected, and the urine and faeces presented no abnormalities. There was a lessened motor power of the arms and legs, the faradic irritability of the nerves and muscles being retained, and the muscular tissue being strongly developed; insecure, staggering gait, loss of the patellar reflex and those of the biceps and triceps tendons, the abdominal and cremaster reflexes being preserved. A slight degree of facial paralysis of the right side was noticed. The usual treatment caused a disappearance of these phenomena, and the patient recovered within three months.

Case 24.

This patient was an old man of seventy years, who after an ordinary attack of influenza developed a peritonitis which ultimately carried him off. The exact abdominal conditions could not be determined post-mortem, as no autopsy was allowed.

Pulmonary involvement occurred,and there was cyanosis and a very rapid respiration.The temperature was elevated three degrees to five above the normal,the pulse was irregular and weak throughout the illness,and great nervous disturbance was manifested by the actions and the speech.In spite of the considerable distension of the abdomen present,the bowels moved regularly;and this would seem to point to the absence of any grave lesion of the intestines.In a few days the distension of the belly became very great:the whole of the lower part of the abdomen became tender on pressure,the liver was much enlarged,firm,and smooth,and effusion of a sero-purulent character was let out of the abdominal cavity by aspiration.

Case 25.

This patient was a man of about forty years of age,who had enjoyed good health prior to his influenza attack,which latter lasted for a few days and he apparently completely recovered.A fortnight afterwards,he had two febrile attacks daily,not accompanied by chills,but by sweating.There were slight and infrequent pains in the right hypochondrium.There were also slight cough,not accompanied by expectoration,and prostration.The patient presented the symptoms of a double pleural effusion,with signs of consolidation of both lungs along the vertebral column.There was no enlargement of the liver.The temperature rose during the febrile attacks to 104.F.and over.The effusion disappeared from the left side, and so also did the remaining symptoms of consolidation,while the exudate was increasing on the right side.At the end of five weeks exploratory puncture was performed and revealed the presence of a sanguineous fluid of a sterile character. Three days later the symptoms were so urgent as to require aspiration.Two quarts of a turbid and odourless serum were taken away;in this streptococcu were discovered,but no pneumococci.The effusion rapidly reappeared,and the aspiration was repeated.The fluid was now more purulent,and slightly foetid.The patient died three days afterwards.

Case 26.

This patient was mechanic who had just attained his majority,who had an ordinary attack of influenza and appar-

ently recovered therefrom, though he at times had a troublesome cough and slight expectoration. He was able to resume his occupation; but this caused the cough to become very severe, and so much so that he had to go on the sick list. He complained of a paroxysmal cough, debility and loss of appetite. The movements of the chest were satisfactory, but a deep inspiration excited the cough. Over the left apex percussion was slightly modified; inspiration had a somewhat bronchial sound, expiration was sharp and prolonged, but there were no râles. Expectoration was very slight, but the sputum contained a large quantity of tubercle bacilli. The only lesion discoverable was the consolidation of the left apex of the lung. He continued thus for four months, when one day rhonchi were heard over the right apex, and also below the right clavicle, and influenza bacilli and tubercle organisms were detected in the sputum. In spite of all this the patient did not seem to resent his indisposition. The temperature was normal. No success followed an attempt to relieve the catarrh of the right and left apices. Tuberculin was now injected, but gave no reaction, though there occurred a greater tendency to cough and increased râles over the apex of the left lung, especially beneath the clavicle. Three days later, this local reaction had passed away, so another injection was given. As this produced no constitutional disturbance, larger doses were now employed. After the third injection the general condition of the patient had much improved. He felt brighter, his appetite was better, his cough had diminished, and there was but little expectoration. In spite of this promise for the better, the patient became much worse after the sixth injection. The sputum was much increased in quantity, and cavity formation seemed to have occurred. The cough was also intensified, the general condition of the patient fell off, and he complained of great debility and pains in the limbs. The left apex showed distinct signs of a cavity, both anteriorly and posteriorly. Percussion over the right apex showed dulness, and many rhonchi could be heard below the clavicle, even as far as the lower edge of the third rib. Both influenza and tubercle bacilli were found in the sputum. The patient continued in this condition for three weeks, when he developed numerous patches of pneumonia in the deeper portions of the lungs. The debility rapidly increased, and the patient died in a septicaemic and exhausted condition

Case 27.

This patient was a woman of twenty-nine years of age, who contracted influenza and developed hoarseness, repeated chills and nocturnal perspirations. The hoarseness improved, but did not disappear; the cough was also diminished, and the sputum was lessened. After six weeks all these symptoms suddenly increased again, and they continued to resist treatment. The patient was of good family and personal history, and also was well developed. Over the apices of both lungs the respiratory murmur was not abnormal, though just a trifle weak. There were dull areas over the liver in front and on the right side, as well as over the ninth rib posteriorly; and over these areas crepitations and diminished respiratory sounds were audible. Influenza bacilli swarmed in the sputum. The temperature remained normal, the pulse was rather quick. The hoarseness improved under the usual medicaments; the dulness in the lower part of the right side posteriorly disappeared in some five weeks. Nevertheless, there were now elevations of temperature, cephalalgia, increased cough, more copious sputum, pain in the thorax anteriorly, and in the same situation crepitant and subcrepitant râles. These signs progressed in the course of the next four weeks downwards anteriorly to the third rib; the sputum contained both the tubercle and Pfeiffer's organisms. In the course of twenty-eight days the latter disappeared, and the patient recovered from the remaining tuberculous condition after due medication and treatment on orthodox lines.

Case 28.

This patient was a very old man, who contracted a severe attack of influenza; the temperature rose, there was much difficulty in breathing, the apex beat of the heart could barely be distinguished, the pulse was accelerated, the respirations also. On the right side dulness extended from the second rib downwards, the percussion note being somewhat tympanitic over the second rib. The abdominal muscles were very tense during expiration. The liver was tender on palpation and was pushed downwards, extending three inches below the costal margins. In front on the right side respiration was diminished throughout, but there were no râles audible. Over the area where the tympanitic percussion note could be elicited, respiratory sounds, not bronchial in character, could be heard, as well as some scattered very fine crepitant

rales.The next day the cardiac sounds were not so harsh, though clear.Vocal fremitus was diminished,but could still be feltComplete dulness on percussion was observed over the entire extent of the right lung,and here bronchial respiration was noticeable.No fever was present.For sixty days this state of affairs on the right side continued unaltered.Now a remarkable loss of strength occurred,with complete senile dementia,so that the patient passed his motions under him as he lay,and he did not recognise his friends.After the dulness had existed for two months,resolution took place in the right upper lobe in a very short time,without the appearance of rales,while in the lower portions the infiltration process remained unchanged.There was no pleural effusion.The patient died in a condition of exhaustion four months after the commencement of his illness.

Case 29.

This patient was a girl of some twenty years,who seems to have previously enjoyed good health and had an excellent family history.She took influenza,and for ten days had such symptoms as pain in the side,pyrexia,difficulty in breathing,but no pneumonic sputum.Effusion into the pleural cavity occurred,and this was duly aspirated.She developed lobar pneumonia and pneumothorax,and died on the third day.

Case 30.

This patient was a working man of thirty-four years of age,the subject of a chronic inflammatory condition in the spinal cord characterised by spasmodic pains in the back and legs,cephalalgia,general malaise,and a feeling of exhaustion.Having suffered thus for three years,he suddenly took influenza,and in the course thereof developed rigors and pyrexial symptoms.Examination of the chest revealed the presence of dulness and crepitant râles over the right upper lobe of the lung in front and behind;the respiratory murmur was weakened here,but throughout the rest of the thorax the physical signs were not abnormal. There was very little cough,and no sputum on the first day of this complication.On the third day of the affection the process invaded the right lower lobe posteriorly,the

left lung still remaining free; at the same time there was a scanty, thick, yellow, purulent expectoration. On the fifth day there was fine crepitation over the right middle lobe, and the patient was visibly weaker. The next evening there was a profuse sweat, accompanied by cyanosis, and the pulse underwent a rapid acceleration. The consolidated areas remained relatively about the same until a fortnight later, when numerous crepitant and subcrepitant rales became manifested, and the pulmonary condition cleared up. For fourteen days or so the strength of the patient was considerably reduced by repeated nocturnal perspirations, and at the end of this period the temperature rose to fever-height for six days- after which it gradually fell to normal during the ensuing six days. It did not again rise. The sputum contained streptococci, but none of Pfeiffer's bacilli. The patient died after another week of suffering.

Case 31.

This patient was a man in his twenty-first year, who had a typical attack of influenza. Six days afterwards the fever disappeared and he felt almost quite well. Two days later there was a rigor, followed by shortness of breath and a sanguineous and purulent sputum. The temperature rose to 105.F., and in the right middle and left lower pulmonary lobe crepitation and relative dulness were elicited. Two days later the patient took the turn for the better and these symptoms disappeared. Two days later the temperature rose to 104.F., but without a rigor, with the reappearance of the dyspnoeic condition, there being also an area of inflammation in the left upper lobe of the lung. Four days later the symptoms again disappeared; and the day after this there was another rigor and the occurrence of of a new area of inflammation in the part of the left upper pulmonary lobe above the spine of the scapula. A crisis again occurred on the fiurth day, and the patient recovered after a tedious convalescence of nearly a month's duration.

Case 32.

This case was one of influenza occurring in a glycosuric subject - the disease being accompanied by a mild chill and sharp pains in the region of the heart pointing to the occurrence of a pleuritic inflammation. The ensuing few days were marked by the development of a

circumscribed exudation in that locality. A fortnight later the patient had a rigor and a dry cough, but the examination of the lungs was negative. The next day, in the lower part of the left lung posteriorly, there was detected a circumscribed consolidation of the pulmonary tissue, and the sputa were rusty and teeming with pneumonic inflammatory organisms. Three days later the temperature fell, and the area of dulness slowly cleared up. Two days later the temperature rose again; there was pain on the right side in front, and during the next few days a large pleuritic effusion developed here. Coincidently with this, there occurred, a fortnight later, inflammation of the lower part of the posterior aspect of the right lung. The usual symptoms of that condition were observed, and from the intensity thereof the patient died in a few days.

Case 33.

This patient was a chronic middle-aged drunkard, who contracted the prevailing influenza, in the course of which he had severe cephalalgia, pains in his legs and nausea, all of such severity as to confine him to his bed. On the fourth day he felt even worse than ever, and the next morning his temperature rose to 104. F., his pulse to 120, and his respirations to 36. Examination of the chest revealed a triplet of small consolidation areas, two in the right lower lobe, and one in the left upper lobe at its base. Starting from these foci, the whole of the right lower lobe and a part of the left upper lobe posteriorly became completely consolidated; but in the same situation in front only a weak tympanitic change of the percussion note could be discovered. The next morning there was no change in the pulse and respirations, but the temperature had fallen a degree. The expectoration was brown, very tenacious, and contained a little blood in streaks. The patient in the evening became delirious, and signs of oedema were observed in both lungs. The pulse could not be estimated, restlessness increased, the face became cyanotic, and there pain on palpation over the liver. A tepid bath was the means of somewhat relieving the respiratory distress for an hour or so, but the patient died in a comatose condition the next morning.

Case 34.

This patient was an assistant in a shop, thirty years of age, who after an ordinary influenza attack complained of dizziness and insomnia, but no pain anywhere. On the third day he had several shivering fits and perspirations, and had to go to bed forthwith. He was seen to be suffering from a slowly -developing pneumonia of the right lower lobe at its lowermost part. The temperature ranged about the third degree above the nommal. Two days later the entire right lower lobe was seen to be affected, but in a rather unusual way, i.e., the dulness over the entire extent of the lower lobe was very slight; over the areas where crepitation first appeared faint bronchial breathing could be heard. Around these areas where the dulness was actually more decided, no respiratory sounds could be heard, and at the lower border of the lesion, anteriorly above and below, crepitation was audible. Here and there bronchial breathing was in evidence; in other places respiration was absent. During the next three days the lesion advanced further in the upper lobe, and extended as far as the scapular spine, but the apex remained unaffected. There was nothing abnormal to be found in the right apex in front; but three days afterwards there developed a new area, which in the course of three days became as large as the process which previously had attacked the lower lobe. Just now the temperature was not high, but the pulse was considerably accelerated. The liver was swollen and painful, the splenic dulness was increased, and the spleen could be felt below the margin of the ribs. On the eleventh day of the affection, a new area developed at the border of the left lower lobe posteriorly; and while the above-mentioned areas of the right side did not grow any larger, those of the left side extended further upwards, so that in the course of five days practically the entire left lobe was diseased. The physical signs here were the same as on the right side; the dulness was not very marked, bronchial breathing could be heard only here and there, and vocal fremitus was not increased. Over certain regions at the edge of the process crepitation could always be detected. The pneumonic areas continued to adhere to their wandering character, and the strength of the patient was gradually compromised, and it was therefore necessary to give him liberal quantities of stimulants. The fever lasted for ten days, and the process then underwent a gradual resolution.

The expectoration at this time presented the usual pneumonic characteristics, and the ordinary symptoms of the affection, particularly delirium, were observed. The patient made a satisfactory convalescence, and was at work again after an absence therefrom of two months.

Case 35.

This patient was an artisan, bordering on seventy years of age, who had a good family and personal history, though he seems to have suffered from pulmonary inflammation of the lobar variety two years prior to the present influenza attack; the latter commenced suddenly with chilliness and perspiration, the temperature rising to fever-height a few hours later. The pulse reacted in sympathy with this and presented the usual febrile characteristics. The following morning the temperature was still about the same, and there was now a considerable amount of dyspnoea, quick pulse, and accelerated respirations. Physical examination of the chest showed, on the right side in front above the hepatic region, a palm-sized area with crepitation, without distinct dulness on percussion. The same evening the temperature was still elevated and continued to be so for three days. During this time the area of pneumonic inflammation extended posteriorly, so that a large part of the right lower lobe was affected; but decided resonance was observed in a three-inch-wide spot to the right of the spinal column. The breathlessness still continued in evidence. The patient was rendered very uncomfortable by his restlessness, insomnia, and a feeling of impending ill; and, while the infiltration advanced posteriorly, the dulness over this area became more intense. There was no increase of vocal fremitus. The crepitation disappeared four days after the extension of the dulness; the breathing remained diminished posteriorly, but was not distinctly bronchial, while anteriorly over the area first attacked it assumed a blowing character. The pulse became much worse, the abdomen was tympanitic, the liver was painful to palpation and swollen through congestion. The urine was scanty and contained a trace of albumin and an abundant sediment. The sputum remained, as from the beginning, of a tenacious and mucous character without exhibiting any distinct colouration. A week later tracheal rattlings were noticed, the lungs became oedematous, and the patient died from general exhaustion in a state of coma.

Case 36.

This patient was a man of twenty-one years of good family and personal history, who at the commencement of an influenza attack had vomiting and a feeling of great debilitation. Early the next morning he had several chills, and these alternated with perspirations during the course of the day. There was severe cephalalgia and lumbar pain. His temperature rose to 103.F. The following day it fell to normal without marked diaphoresis. Physical examination of the chest showed increased respiratory murmurs in the lower part of the left lung behind, but the remainder of the organ was not abnormal. On the morning of the third day, after the fall of the temperature, there appeared under the angle of the left scapula slight dulness over an area the size of the palm of the hand, with blowing respiration without any crepitation. This area remained until the next evening. At the same time there was great restlessness and cough without sputum. After a very restless night, the patient complained of severe headache. The expectoration consisted of a tenacious and brownish material. On the right side the percussion note was normal up to two inches from the border of the liver, where a distinct tympanitic area was discovered. On the left side the tympanitic note of the stomach was audible as far up as the fifth rib, in the anterior axillary line, and above this region dulness existed which increased posteriorly. Vocal fremitus was here diminished. Behind there was a clear note as far as the sixth rib: from that point downwards dulness, with a tympanitic character and a distinct cracked-pot sound, could be elicited. There was also slight dulness over the corresponding situation on the right side. The respiratory sounds were normal over the upper portion of the left lung behind-but from the fifth rib downwards they were decidedly bronchial, without, however, any crepitation, even at the edge of the area of dulness. Vocal fremitus was increased over this area; beyond this the percussion elicited nothing unusual. On the seventh day of the patient's illness the morning temperature was 102.5.F., the pulse 80, and the evening hyperthermia 105.5.F. The whole of the left lobe was dull and crepitating. The patient had a good sleep during the night, and the next day the temperature fell to normal and the crisis of the disease occurred. He made an uninterrupted convalescence, and seemed quite

recovered by the end of a further fortnight.

Case 37

This patient was a man of the same age as the foregoing, the subject of cardiac trouble, who developed the symptoms of a typical attack of influenza. The temperature rose during the first few days from normal to 102.F. On the evening of the fourth day it rose a degree higher, and during the night profuse sweating was observed. The next morning the temperature fell to normal, and the small and soft pulse was lowered in sympathy with this. There was dulness on percussion, with crepitation in the upper portion of the right lung behind. The respiratory murmur could not be heard. The same evening the temperature rose to its former height; the next morning it was a fraction of a degree lower and the pulse also fell from fever-rate to the normal. There was marked dyspnoea, but no expectoration was raised. There was now dulness behind over the entire right side, and crepitation was audible over the dull portion, but no bronchial breathing; slight crepitation could be heard over the lower margin of the left lung. There was tympanitic resonance over a small area, three inches wide, over the liver, and above this on the right side in front was clear resonance with a few bronchitic râles. The evening temperature was again elevated to its former height, but fell the next morning to normal. The patient's condition remained unaltered up to the ninth day of the disease. On the morning of this day the temperature was two degrees above the normal, and examination revealed dulness over the middle lobe of the right lung. Behind, bronchial breathing and crepitant râles were audible over the areas of dulness, and diminished respiratory sounds over the middle lobe. The liver was painful and a trifle enlarged. The cardiac sounds were clearly audible; the apex beat was diffused, the pulse was 140. The feet were swollen. The evening temperature was 103.F. The sputum was reddish and more or less frothy. The following day the evening temperature rose a degree higher, and the pulse and respirations were accelerated in sympathy. There was decided dyspnoea, and rattling sounds could be heard. The expectoration was yellowish in colour. There was dulness at the left apex, less marked under the collar-bone, passing into tympanitic resonance at the level of the third rib, and becoming dull again at the fourth. On the

right side there was dulness on percussion at the apex, slight tympanitic resonance under the collar-bone, and dulness again at the level of the third rib. The hepatic dulness extended to the umbilicus, the liver itself was palpable, hard, and tender to pressure. The stethescope revealed bronchial breathing on the right side above, and loud tracheal breathing with crepitations from the third rib and also over the border of the liver. On the left side the sounds in the upper portion were the same as on the right side; below there was sharp, but not bronchial, breathing. The cardiac sounds were clear, the second pulmonary sound was not increased. The percussion note was tympanitic, but muffled at the upper portion of both lungs behind; below there was a clear area, with spots of dulness interspersed, on the left side, and absolute flatness on the right side. Vocal fremitus could be made out on both sides. The same evening bronchial breathing was audible over both apices, distant and faint bronchial breathing below on the right side, and crepitant and bubbling rales on the left side below. The pupils were dilated, and the urine contained a copious sediment. The patient died on the twelfth day from exhaustion.

Case 38

This patient of thirty years, of good family and personal history, had his influenza attack ushered in with a chill followed by a sensation of heat, severe cephalalgia, great weariness of the limbs, dyspnoea, and troublesome cough with expectoration. On the third day he was no better, and complained of dizziness, shortness of breath, debility and even more troublesome cough. His face was flushed, the pulse was rapid, and the breathing was deep and effected with considerable difficulty. The usual physical methods revealed dulness, bronchial breathing, and medium coarse bubbling rales posteriorly at the base of each lung. Over both organs expiration was sharp and prolonged, and was accompanied by sonorous and whistling râles. The sputum was profuse, of a yellowish colour, and contained numerous Pfeiffer's bacilli. On the ninth day, the dulness on the left side had extended upwards the width of a rib; over the dull portions were heard coarse bubbling râles, and at the same time there were crepitant ones and signs of bronchitis at both apices. He seemed, on the whole, now a little improved in his condition. On the eleventh day, many fine and coarse bubbling râles were

audible over the dull areas behind, while in front there was decided dulness on the right side, both above and below the collar-bone. Five days later the dulness behind had disappeared, but there was still to be heard some crepitant râles, together with slight bronchial breathing. Three days later the dulness and râles anteriorly had entirely gone, but posteriorly there were again some faintly dull areas in which could be heard coarse bubbling râles mixed with crepitations. The temperature now fell to the normal, and the patient recovered after a three weeks' convalescence.

Case 39.

This patient was a mechanic turned sixty years of age, who developed influenza with a rigor, headache, cough, expectoration, pains in the legs and arms, and a feeling of exhaustion. His countenance became decidedly cyanotic, he had dyspnoea, but there was no pain in the thorax. There was dulness on percussion in the lower part of the right side of the chest, and the respiration in this locality was rough. A variety of bronchial râles were audible over the entire lung. The pulse was small and frequent. Nine days later, the subjective symptoms were less marked. The cough persisted, and there was profuse expectoration. There was no longer dulness on percussion, but the whistling and bubbling râles were still audible over the whole lung. Ten days later the cough, expectoration, and the râles were still present, but were less marked. The patient completely recovered at the end of another fortnight of treatment in the usual lines.

Case 40.

This patient was a working man of twenty-five years of age. His family and personal history was good. He took influenza, and suffered from angina, hoarseness, cough with expectoration, malaise, and debilitation. There was slight bronchial breathing. The mucous membrane of the trachea was very red, and both vocal cords were swollen and injected. During the course of his fortnight's illness the temperature had the usual elevation, accompanied by the ordinary febrile phenomena. The expectoration was mucopurulent in character, and it contained plugs of pus which were sometimes like casts of the smallest bronchial tubes. He made an uninterrupted convalescence and was soon back at work.